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OF THE

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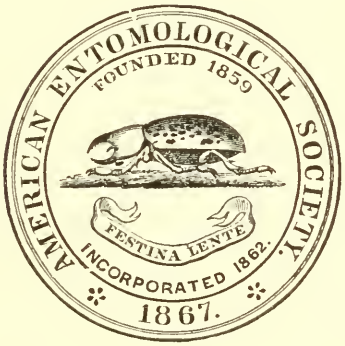

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AMERICAN ENTOMOLOGICAL SOCIETY.

VOLUME XXXIX.

Notes on CHLAMYDAE with descriptions of a few new forms.

BY FRED. C. BOWDITCH.

The new arrangement of my material in this group shows a number of interesting new forms. For the benefit of any one who may work on this family I will detail a method of mounting which is effective; easy inspection of the antennae and prosternum is necessary, so that I am prone to mount all, except very small species, on fine japanned steel pins. Place the specimen to be mounted in a weak solution of ammonia and water (Wenzel's method), if it is glued on a card, as is often the case, by the time it bobs to the surface it is usually ready to handle. Remove with small forceps onto blotting paper, brush off any stray dirt, and when dry turn face down, and with pinning forceps run a pin through into the blotter, still holding the forceps, raise the pin and insect, and place on the edge of a small block of paper and run the pin through to the desired height. Usually I hardly touch the specimen with my fingers, only sometimes steadying it. If I have several of one species one may have the antennae exposed, in which case I brush it out to show or mount one on a piece of card. If only one specimen is at hand it requires patience to get the antenna out of its groove; the specimen should be left longer in the softening bath and the visible moisture be allowed to dry off on the paper; my usual way is then to take the specimen between the thumb and forefinger of the left hand upside down and head out-

wards and so held that the anterior edge of the thorax is supported by the finger, then with a fine needle pry the head out of the thoracic cavity; if the specimen is rightly held the necessary pressure to accomplish this comes against the forefinger and does not loosen the thorax, when the head starts, the antennae come out and are easily spread, the specimen with displayed antennae may be conveniently indicated in the collection by a small square of colored paper.

The characteristic hump and median sulcus of the thorax presents great variety of shapes and sizes; a common feature is to have the thorax cut away behind, leaving the upper edge more or less carinate; this cutting away is spoken of as being declivous behind, and in very many forms the part next the sulcus and some of the hump anteriorly is more or less colored or darkened so that the thorax appears spotted. The base of the declivity runs around the hump more or less plainly to the front and forms the basal sulcus. The sculpture of the elytra (aside from the punctures) consists primarily of four lines or costae, a sutural, median, humeral and sublateral. From being entire, they vary to wholly absent, but in a great majority of cases they are more or less present, though broken or divided or varied by humps, tubercles or ridges. The most constant and important appear to be the median and humeral, especially the latter. The shape of the prosternum presents great differences and should be carefully compared.

In the Entomologist for 1904, p. 198, Mr. Jacoby describes *Chlamys seminigra*. Mr. C. J. Gahan kindly writes me that the type (in British Museum) is a female, Mr. Jacoby speaks of other specimens in the Donckier collection. These are before me, three ♂'s, seven ♀'s, the epistome of the ♂ is profoundly excavate while the head is hardly enlarged beyond that of *Chlamys*, the species probably will have to go into a new genus, but for the present it may be put with *Pseudochlamys*.

Among the specimens in the second Jacoby collection labelled *nodosa* Klug. from British Guiana, is a very fine example of *C. chevrolatii* Fauv. It is larger than the *nodosa*,

more shining, with sulcus of the thorax much dilated anteriorly.

In Proc. Zool. Soc., 1901, Mr. Jacoby describes *C. insularis* from Haiti. He had previously used this name for a Central American form, Biolog., p. 78. So for the former I would suggest the name *haitiensis*.

C. boliviana Jac. has at the rear of the thorax on the crest of the declivity four obsolete tubercles, in a semicircle, analagous to *deyrollei* Jac. or *kermes* Lac. The rear of the thorax is obsoletely toothed, approaching *amazonica* Jac. and *humeralis* Bow. A form which at present I regard as a variety of *boliviana*, occurs in which the elytra have a narrow, transverse yellow fascia from shoulder to shoulder, the front edge of the fascia just taking in the scutel. This variety is from Cochahamba, Bolivia.

The types of all the new species described in this paper are in my collection.

Pseudochlamys? rufescens nov. sp. Rufous, with here and there darker clouds. Head very large, flat, with great mandibles, thorax very thickly and finely punctured, with a rounded hump, median sulcus very faint but discernible behind, where it is bordered by two dark clouds after the manner of many *Chlamys*, suture smooth, prosternum wide, very abruptly narrowed, at about the anterior third, remaining two-thirds a little less narrow and parallel; length 4¾ mm.

Type.—One ♂: St. Catherine, Brazil.

My only example of *P. megalostomoides* Lac. is a ♀, so I have no opportunity to compare the characteristics of the ♂, but the epistome of *rufescens* seems hardly sufficiently excavated to bring it into this genus, the excavation is smooth and slightly concave, not "cavernous," the margins slightly thickened and the angles prolonged, the scape of the antennae is much thickened at the end and somewhat angularly prolonged inward. The hump of the thorax is very large at its base and occupies nearly the whole width of the thorax. The elytra show faint elevated lines in the usual places, with faint connections and tubercles here and there, the most prominent of the former is ante-median, a little to the side. There is a very moderate tubercle at the middle of the base,

and the apical region shows a good many broken and one fairly marked sutural ridge. The elytra are somewhat compressed laterally behind the shoulders, pygidium coarsely rugosely punctate with a faint median line, pectus and thighs with a dark spot.

Diaspis apicicollis nov. sp. Bronzed, thorax greenish; elytra coppery brassy, becoming dark behind; labrum and antennae dark fulvous: thorax elevated behind into a high peak which is bent backward at its apex; sulcus well marked behind and at apex of hump, becoming obsolete in front; metascutellum very plain; elytra narrow behind with a very strong oblique ridge from the humerus almost to the suture, which is dentate; prosternum broad, very moderately compressed and obtuse behind; length 3.5 mm.

Type.—One ♂; Toledo District, Br. Honduras (Peck).

Head finely punctate, with a fine line on the vertex, thorax rather smooth and dull, with scattered fine punctures which gradually become thick and large, going up the sides of the hump, which is well limited at the sides and behind by a smooth basal sulcus, which is continued towards the front by a shallow depression vaguely colored greenish. The hump has the appearance of being pulled back, with the apex bent back so that it is on a line with the rear edge of the thorax. Elytra are sparsely punctate, more closely behind, the oblique ridge running very strongly to about the middle of the suture; it is joined, or nearly so, by two lines from the base, one sutural, the other basal median. Between these two short lines is formed a deep pit which shows brassy bronze, including the scutellar region; the oblique ridge forms the forward edge of an oblique constriction; the usual elevated lines show faintly at the rear as two or three costiform tubercles and the punctures become obsoletely reticulated; pygdium punctate, uneven, with a faint median line.

As a matter of convenience I prefer to retain the old name *Diaspis* aside from Mr. Schaeffer's paper in the Brooklyn Bulletin.

The noticeable features are the thoracic hump, the oblique ridge and the coloration.

Chlamys rugicollis nov. sp. Quadrate, above bluish-green, cyaneous shining; below and legs purple, insides of femora more or less cupreous, pygidium cupreous, antennae, except the first joint, the mouth parts and tarsi, flavous; thorax coarsely punctate, rugose on the hump, which is large and rounded, deeply divided by a wide sulcus which nearly attains the anterior margin, a well marked lateral tubercle and also one on the side of the hump near the tip; pygidium moderately closely punctate and with a fine median carina; prosternum very abruptly narrowed at about the anterior quarter to almost a knife edge; length 5–5½ mm.

Type.—♂; Jatahy Goyaz, Brazil, two ♂'s, one ♀, three examples.

Head of ♂ with front and vertex channelled, more or less cupreous, particularly the epistome, ♀ not as bright and the lower part of the channel not as obvious, surface punctate, antennae with the scape more or less cyaneous, the second joint rounded, the third and following transverse and dilated, punctuation of the thorax coarse and thick with a tendency to become strigose, especially on the hump, at the sides, and behind; the hump well elevated, reticulated punctate strigose, the ridges limiting the sulcus, branch obsoletely at the vertex and flow down over the subsidiary side tubercle, the sulcus itself is closely rugosely punctate; the elytra are hardly compressed behind the shoulders, rather coarsely reticulate punctate in the intervals, especially at the sides and behind and with very strongly raised costae as follows: a sutural which curves outward, and then inward nearly to the suture at the middle where it curves outward again and joins the median (somewhat like *surinamensis* Jac.), the median runs parallel to the sutural, then continues to apex, where it ends in a costiform tubercle. There are about two short transverse connections to the sutural and humeral near the middle, the humeral and subhumeral both form costiform tubercles near the apex, the subhumeral and median have a marked tendency to join in a loop at the apex. There is also a small tubercle at the basal end of the sutural costa—mesosternum hair.

Belongs to Lacordaire's Group 7.

Chlamys truncatus nov. sp. Elongate, opaque, head dark, thorax coppery bronze, elytra opaque brownish-black tinged with purple, end of the body squarely truncate, the truncation of the elytra bronzed, abdomen brown opaque, body beneath of the latter color; antennae, except the end, labrum and tarsi, fulvous; prosternum with sides parallel at its front, then gradually narrowed to middle, the rear half a parallel edge, length 3.5 mm.

Type.— ♀ ; Cochabamba, Bolivia, two ♀ specimens.

Head thickly and rugosely punctate, antennae with second joint obconic, third stout and trigonate, remainder transverse, the last four or five joints dark, thorax with rather coarse punctures, not thick, hump large, declivous and well defined at the base, rather deeply divided by the median sulcus, which has a deep pit at the apex of the hump, and then is continued broadly to nearly the anterior margin. Each side of the middle is divided by two irregular transverse ridges which pass down to the sides. There are two lateral tubercles, and the rear edge is prolonged and sharply notched behind. The elytra have the usual sutural and median lines, the others being broken. The entire surface is reticulate, becoming coarser at the apex. The edge of the truncation is marked on each side by two sharp, prominent tubercles, one sutural and the other median; suture finely dentate, pygidium punctate, obsoletely tricarinate, body beneath coarsely reticulate.

The peculiar coloration and truncate elytra will distinguish this form; belongs in Lacordaire's Group 7.

Chlamys carinipennis nov. sp. Elongate, shining brown, body below, black, hump of the thorax darkened, its anterior apex deeply bilobed and elevated into two sharp fan-shaped carinae; elytra with the usual lines more or less abnormally elevated into sharp carinae, apex abruptly truncate, suture smooth or nearly so, prosternum strongly margined with sides at first parallel, then abruptly narrowed to a trifle beyond the middle, then gradually enlarged again to an obtuse end, thus presenting a definite constriction at the middle; length $3\frac{1}{2}$ mm.

Type.—One ♂ ; Cochabamba, Bolivia.

Head thickly punctate, the vertex with two small tubercles, somewhat like *occipitalis* Lac., only not so prominent, antennae with 2d joint stout, obconic, 3d stout, trigonate, re-

mainder transverse, the ends darkened, thorax polished, finely, sparsely punctate, becoming coarse and thick on the apex of the hump, which is strongly raised and sharply declivous and deeply cleft by the median sulcus. The apex is thrown forward so as to project beyond the head, and compressed, forming on each side a smooth, thin, sharp divergent fan-shaped edge. The margin of the sulcus to the rear shows as strongly raised into a supplemental ridge, which gradually disappears on the sides. The rear edge shows two small tubercles in front of the scutel, lateral tubercle not very prominent. The elytral punctures are sparse and fine in front, coarser behind. The elytral lines are strongly raised, leaving deep pits in the intervals, the sutural, median and humeral unite in forming a rather thick elevation about the middle. These lines are continued to the truncation and end in two strong tubercles placed on either side of the middle of the edge of the truncation, the pygidium shows a broad smooth line, carinate behind, deeply longitudinally foveate, on either side at the bottom, the sides of the abdomen and body are somewhat brown next the elytra, remainder opaque black, legs brown, thighs darker.

Belongs in Lacordaire's Group 7 next *truncatus* nov. sp.

Chlamys rotundus nov. sp. Rounded ovate, like *cistella* Germ. uniform brassy bronze with labrum and antennae ? (broken type) joints 2–11 dark fulvous, thoracic hump very moderate, rounded declivous behind and like *cistella* closely and rather rugosely punctate at apex, median sulcus hardly visible anteriorly, very moderate behind; elytra sparsely punctate, becoming reticulate at rear, the sutural costa plain as far as middle, the humeral faintly traceable to apex, the others difficult to trace and more or less broken; pygidium sparsely finely punctate, faintly quadrately impressed, median carina fine, under side and legs tinged with dusky, prosternum (viewed from front) drawn gradually to a fine point at posterior two-thirds: length $3\frac{1}{2}$ mm.

Type.—One ♀; Cochabamba, Bolivia.

Head lightly punctulate with a fine groove on the vertex, the punctuation of the thorax is mixed coarse and fine; there is a moderate but plain lateral tubercle, the lateral sulcus is well marked at the side, where it passes under a small tuber-

cle which forms the side of the hump (seen from the side behind), the apex of the hump is finely rugose, sides of abdomen with a large though not particularly prominent tubercle, suture dentate. The brassy color and shape will aid in identifying this, should be placed next *unicolor* Jac. (type in my collection).

Chlamys spinicollis nov. sp. Quadrate, cyaneous bronzed, head (antennae ?), sides of the thorax and two spots in front, whole body beneath except parts of meso- and metasternum bright orange-fulvous; thorax with a six spined hump (three on each side) and each elytra with about twelve strong spinous tubercles, suture dentate, prosternum very narrow in front and becoming carinate behind, almost tuberculiform in front when looked at from side; length 4½ mm.

Type.—One ♀; Jatahy, Goyaz Prov., Brazil.

Head finely punctate, with a small mark at the vertex, antennae with 2d joint short, 3d a trifle longer, cylindrical, 4th and 5th transverse (rest missing), thorax finely and closely punctulate, hump divided by a deep wide median sulcus obsolete in front, and each side divided again transversely, the effect being three tubercles on each side, of which the two along the middle are much the stronger and form obtuse spines, the hump proper is green bronze, and this color is continued by the median sulcus and an arm on either side to the anterior margin, forming two triangular fulvous spots in front; the punctuation of the elytral intervals is coarse and rather regular, finer behind, each elytra has the following tubercles: a strong basal sutural, a smaller immediately behind, a large basal median, a small double humeral, a strong transverse lateral median and about seven scattered equally between the middle and apex, the apical sutural being perhaps the most prominent, the two basal and the transverse are the most marked, pygidium thickly finely and somewhat strongly punctate with a smooth median line; body beneath thickly, legs more finely and sparsely punctate.

The color and spiny appearance easily separate this form, which I place near *spinosa* Koll.

Chlamys goyazensis nov. sp. Quadrate cylindrical, dull brown, thorax with a strong raised hump covered with tuberous asperities, sulcus almost entire, deep, smooth and widening in front from about

the middle, lateral tubercle well marked, elytra slightly constricted at middle, intervals thickly punctate, each elytron with about fourteen spinous tubercles; pygidium quadrate, impressed, tricarinate, the side carinae arcuate and broken; prosternum rather narrow in front, slowly increased to an obtuse point, so as to appear sulcate, all the tibiae dentate within; length 4–4½ mm.

Type.—♂; Jatahy, Goyaz; one ♂, two ♀ specimens.

Head rather sparsely punctate, antennae stout, 2d joint obconic trigonate, 3d joint shorter than 2d, trigonate, closely applied to the next, 4–11 strongly transverse, thorax thickly finely punctulate, irrorated here and there with darker clouds, noticeably so on either side of the median sulcus behind, basal sulcus well marked by a deep and rather smooth groove. The most noticeable tubercles of the hump are four placed anteriorly near the median sulcus, one above the other on the anterior declivity: the median sulcus behind these is edged with a uniform row of small smooth tubercles; anteriorly at the side is a costiform tubercle (seen from behind); of the elytral tuberosities there are on each elytra two at the base, a sutural and median, then there are a series of five much smaller elevations occupying the median belt, four of which are arranged in a transverse line in the middle; the apical portion is occupied by seven or eight strong spinous tubercles, one being sutural post median and a group of three arranged triangularly at the apex, these last being the longest of all. The usual elytral lines are faintly traceable between the tubercles, suture finely dentate, abdomen coarsely punctate, sides obsoletely bituberculate.

I place this species near *schottii* Lac. The dentate tibiae easily separate it.

Chlamys sumichrastii nov sp. Chestnut brown with a reddish tinge to the thorax, the punctuation slightly darker, especially on the elytra, antennae dark at tip, thorax with a strong conical rounded hump (somewhat like *natteri* Koll.); sulcus entire though not deep; elytra impressed with rather large brown punctures, the usual lines almost obliterated, the humeral showing best, and ending in a small costiform tubercle; the other elevations are small, the scutellar region is depressed and darker in color; suture dentate in almost its whole length; carina of pygidium obsolete; prosternum obliquely narrowed

to a little more than antereor third, then parallel to obtuse; apex margined, channeled and with a line of punctures; length 4 mm.

Type.—Isthmus of Tehuantepec (Sumichrast): formerly in the collection of G. D. Smith, of Cambridge, Mass., and labelled with the above name by the late G. R. Crotch.

Form is subquadrate, compressed behind the humerus, 2d joint of antenae rounded, 3d short and trigonate, the punctuation of the thorax is thick and fine, becoming coarse and rugose on the tip of the hump and edges of the sulcus, which widens at the anterior apex and is marked on either side by the usual ridges; the common lateral tubercle is only indicated by a very faint swelling, the sides of the hump are marked by darker clouds, and abruptly declivous, the markings of the elytra are vague, though viewed from behind a little to one side, the humeral ridge shows up plainly, while there are plenty of small tubercles and fragments of lines, nothing marked to catch the eye, body beneath coarsely reticulate; somewhat resembles in appearance a very small specimen of *discipennis* Jac. without the thoracic spots of that form; owing to the form of the thorax I place this provisionally in the *natteri* group though the usual elytral tubercles are wanting.

Among my material is a chestnut brown ♀ example from Maroni, Guiana, which I place provisionally as a var. of *schottii* Lac. It seems, however, to have many points of difference, a few more examples, especially ♀, are needed. Lacordaire speaks of an entirely reddish form of *schottii*, I have not seen any such, and all my examples are from Brazil or Amazons.

Chlamys plagiata nov. sp. Subquadrate, luteus, some spots on head and front of thorax and a large diamond-shaped spot taking in the hump of the thorax and extending beyond the middle of the elytra, velvety black, a little diluted at the rear end of the thoracic sulcus; pygidium with fine median carina and a deep lateral elongate fovae; prosternum gradually narrowed to about posterior two-thirds, then parallel to apex; length 3–3½ mm.

Type.—♂; Cochabamba, Bolivia; two ♂ and ♀ specimens.

Head with upper half black, except two spots on vertex, antennae with last four or five joints dark, 2d globular, 3d short cylindrical, 4th wider trigonate, thoracic punctures large, reticulate at summit, where the sulcus is much widened, the hump is rather conical, abruptly cut off in rear, well limited at the sides, and with the upper edge carinate, joining the sulcus, which is narrow behind and obsolete in front, elytra with larger punctures than the thorax, the dark area almost devoid of tubercles except one at the extreme rear and another at the extreme outside edge anteriorly, the usual lines are not well marked, but are indicated by fragments and small tubercles, of which latter there are three on the outside edge of the black patch, subbasal, median and subsutural (the first and last being the black tubercles above referred to) and about two or three around the apex, of which the sutural is the most noticeable, suture dentate, sides of abdomen with two obtuse tubercles, the body below is light colored, except the prosternum is dark.

Seems nearest to *dorsalis* Lac. which I have not seen. Easily separated by the light color with diamond shape dark spot.

Chlamys gounellei nov sp. Elongate; reddish rufous above, flavous below, last six joints of antenaae black; thorax with a large rounded hump, obsoletely sulcate; elytra with the usual raised lines and everywhere coarsely reticulated; pygidium punctate, with fine median carina; prosternum rather narrow in front and gradually tapering to a sharp point at rear; length 3½–4½ mm.

Type.—♂; Jatahy, Goyaz, ♂ and ♀; also one example in the first Jacoby collection from Minaes Geraes, Brazil (Gounelle), ticketed with the above name which seems to be MSS.

Head thickly punctate, with a slight depresson on the vertex, antenae with 2d joint short obconic, 3d the same length, trigonate, remainder transverse and dilated, thorax thickly and finely punctate, becoming coarser going up the hump, which is rather sharply declivous behind and limited at the sides; the sulcus is visible for nearly the whole length but is nowhere pronounced. The color of the thorax is flavous

with dark rufous clouds on either side of the sulcus behind, this color continuing more or less toward the front and showing several small spots at the side, of which the one at the side of the hump behind the middle is the most noticeable. The elytra are almost uniformly (except apex) rich dark reddish, the elevated lines showing as strong costae, the sutural and median being the most obvious casually and the latter extending nearly to the apex, and showing at its base a sharp prominent tubercle; the reticulation is everywhere plain and becomes coarser at the apex. Suture is dentate, the sides of the body are nearly parallel, and show only a very faint compression behind the shoulders. The body below is very finely punctured in great contrast to the upper surface.

Should be placed near *lacordairei* Jac., which it resembles in shape, but the dark color which shows on the elytra of that species as a spotted band entirely suffuses the elytra in *gounellei*.

Chlamys lutescens nov. sp. Stout, quadrate, luteous, rear of the thorax clouded with rufous-purple, and elytra with a common median rufous-purple spot and a vague cloud on either side, thoracic hump rounded, convex in front, declivous behind, with a row of about six tubercles set in a curve on the top edge of the declivity; median sulcus behind wide and shallow, obsolete in front, about eleven or twelve tubercles on each elytron, the most prominent being a median subbasal and a sutural apical; suture dentate; prosternum abruptly narrowed to about the middle, then narrow and parallel and thickly margined to obtuse end; length 5.5 mm.

Type.— ♀: Jatahy Goyaz, Brazil; two ♀ specimens.

Head slightly convex, thickly punctate, antennae, rather long, 2d joint obconic, 3d and 4th elongate, slightly dilated, 5–11 transverse, thorax very thickly punctate with a well defined obtuse lateral tubercle, separated from the hump by the basal sulcus, which is fairly limited, and ends on the anterior face in a deep depression. The hump is shaped as in *deyrollei* Jac. and *kermes* Lac. *et al.*, *i. e.*, wide, convex in front, moderately declivous behind with a row of tubercles on the upper edge. The median sulcus is wide behind, feebly limited on the sides and passes between the two apical

tubercles, which are slightly curved backward at the apex. Beyond these it is defined by a slight ridge which speads out over the front in the shape of about two faint lines on each side and gradually vanishes. The elytra are thickly and finely punctate somewhat compressed behind the shoulders, each side having tubercles as follows: a small subsutural, the median subbasal above mentioned, which is easily the largest of all, blunt and obtuse, a line of five or six obliquely from the humerus to the suture back of the middle, the apical above mentioned, which next to the basal is the most prominent, and about four other small ones scattered about between the oblique line and the apex; all of the tubercles of this line except the top one are rufous-purple, as are also some of the small ones at the rear, some of the punctures also are here and there purpled, pygidium very coarsely punctate, arranged in transverse lines, obsoletely carinate at bottom, sides of abdomen with a large swollen tubercle, body beneath coarsely reticulate.

I place this form near *kermes* Lac.

Chlamys aureopilosa nov. sp. Opaque black, head and anterior part of the thorax evidently, and remainder of the body above, sparingly clothed with short recumbent golden hairs, becoming sparse at apex; antennae, mouth parts and legs flavous with hind femora darker; thoracic hump very moderate (like *inconspicua* Jac.); median sulcus nearly entire; elytra with sutural and median lines plain and transversely connected at the middle; suture finely dentate; prosternum gradually narrowed to an obtuse point, exposed part of body beneath dull, very closely and coarsely punctate with very close appressed yellow hairs, obsolete at the rear; length 3 mm.

Type.—♂ (?); one example, "Mexique" (2 Jac. Coll.).

Much smaller and not as stout as the Brazillian *stygia* Lac., but with the yellow pubescence much more evident; as on the front of the thorax it is visible to the naked eye, 2d joint of the antennae is very stout, obconic and trigonate, 3d quite as stout but still obconic, trigonate, though closely approaching in size and appearance the remainder, which are dilated transverse, the punctuation of the thorax is largely obscured by the pubescence, but the tip and rear of the

hump are nearly bare and rugosely punctate, lateral tubercle plain, of the elytral lines the two above mentioned are by far the most prominent, the others being rather broken, the median shows a faint tubercle at either end, the apical being costiform, the punctuation has a tendency to become reticulate at the rear, the pygidium is coarsely pubescent with an obsolete median carina.

Should be placed near *stygia* Lac., and is easily distinguished among the Mexican forms by the golden pubescence.

Chlamys pilosicollis nov. sp. Elongate, opaque black, antennae (except last three joints), palpi and tarsi fulvous, anterior part of the head and thorax with very fine sparse yellow pubescence or setae, suture smooth; prosternum gradually narrowed to a fine point and punctate, with golden setae; length 3 mm.

Type.—♂; Costa Rica (P. Biolly), No. 206; three ♂ specimens.

Head closely and finely punctured, antennae with 2d joint stout, obconic, 3d and 4th rather elongate and slightly thickened triangularly, following transverse and dilated, thorax finely punctate, becoming rugose on the front and apex of the hump, which is rounded, well limited by the basal sulcus and with a well defined median sulcus which is obsolete before the anterior edge, lateral tubercle well marked, elytra quadrate, very slightly compressed behind the shoulders, the sutural and median lines plain, transversely conneeted at middle, the latter costiform at apex, the other lines traceable, but not marked and much broken, no tubercles of any prominence, pygidium thickly punctate, finely tricarinate, the lateral carinae more or less obsolete, body beneath coarsely reticulate, the mestasternum with more or less golden setae, the front and middle femora are obsoletely rufous.

C. inconspicua Jac. closely resembles this species, but the yellow setae will serve to separate it; should be placed near *aureopilosa* supra.

Chlamys similis nov. sp. Opaque black, tinged with brown, antennae, except the tip, labrum, mouth parts and tarsi wholly, and anterior and middle legs partially, fulvous; thoracic hump rounded;

median sulcus nearly entire; elytra with sutural and median lines strong, emphasized by rather prominent tubercles or costiform ridges at both ends and the median transverse connection, suture smooth; prosternum evenly narrowed to a sharp point; length 3 mm.

Type.—♀; Costa Rica (P. Biolley); five ♀ specimens.

Head finely punctate, antennae short with 2d joint stout, round, 3d and 4th cylindrical, 5th very slightly dilated, 6–11 forming a compact club, thorax finely punctate, becoming coarse and rugose at tip of hump, which is moderate, rounded, well limited at base by the basal sulcus, an obtuse lateral tubercle and the side of the hump obsoletely swollen, the median sulcus is dilated at the apex and is nearly entire, the usual lines of the elytra are without special feature except as above stated, the form is rather elongate, square, very lightly compressed at the sides, pygidium with fine median carina.

Very similar in general appearance to *inconspicua* Jac., but much larger. By its antennae this form approximates Exema.

Chlamys humeralis nov. sp. Entirely opaque orange-yellow above and below, except that the mandibles, eyes, antenna joints 2–11, a round dot on the humerus, the tarsi, the end of the tibiae and all knees are black; thorax with two small teeth behind; elytra strongly punctured with about four raised lines, the sutural entire and slightly subtuberculate at the base, ; suture dentate; prosternum long, gradually narrowed to middle, then nearly parallel to the obtuse end; length 4 mm.

Type.—♀; Cachabe, low c. XII, 96 (Rosenberg).

Head is thickly punctate, obsoletely channelled, antennae with 2d joint stout, obconic, 3d elongate triangular, somewhat dilated, remainder dilated, thorax thickly and evenly punctate and with a rounded hump, which is faintly sulcate, broadly so in front, but everywhere obsoletely and faint (best seen from above sideways); the elytral punctures are large and regularly placed in rows, the sutural and median lines are both sharply cariniform at the base; the former attains the suture at about the middle and so continues nearly to apex, the median is also entire and parallel to the last and at the end is obsoletely joined to the sublateral,

the other lines are semiobsolete. The usual median carina of the pygidium is obsolete.

Very close to *amazonica* Jac., but that species has only the antennae black, no other marks. The punctuation and lines of the elytra are very different and the prosternum differs in shape, *amazonica* being much more gradually narrowed from front to rear, both species have the small teeth on the thorax next the scutel.

Chlamys serratifrons nov. sp. Flavous, with purplish clouds on the hump of the thorax and on the elytra, noticeably one behind the scutel, front of the head from the labrum back nearly to the anterior edge of thorax, deeply excavated, the upper part with the sides rounded to a sharp point at the rear, the apex of the point almost attaining the rear margin of the head, the entire edge sharply carinate, with three teeth on each side, the lowest and largest at the outer angle of the epistome, the other two at the canthus of the eye; rear half of the suture dentate, prosternum rather abruptly narrowed just before the half, then nearly parallel, chanelled, margined and punctate to obtuse end; length 4.5 mm.

Type.—♂; Amazons, first Jacoby collection.

The antennae are rather long, the five lower joints rufous, the remainder black, the 2d joint very stout, rounded and obconic, 3d and 4th elongate, nearly equal and only slightly dilated, the excavation of the head is everywhere opaque, except the anterior angles, which are smooth polished, the teeth are sharp and slightly upcurved; beginning at the upper canthus of the eye, the excavation is narrowed by an angulated and curved line to the rear point, which almost attains the margin of the thorax. The thorax is covered with punctures which are coarse at the apex of the hump. which is large, rounded and rather sharply declivous, and sharply limited by the basal sulcus, the median sulcus is broad and well marked, obsolete in front, the front and rear declivities are colored with rufous clouds, the rear edge has two obtuse teeth over the scutellum, the elytra are strongly constricted at the sides behind the shoulders, depressed about the scutel and uneven with tubercles and ridges of which the most prominent are as follows: three sharp tubercles below the base, arranged transversely, a

rather strong ridge from the humerus obliquely to the middle, where it ends in a sharp tubercle near the suture. This tubercle has a costiform continuation parallel with the suture to the apex. The punctuation is fine and the depressed areas have a tendency to rufous coloring which is especially marked back of the scutel as in *scortillum* Lac.; pygidium coarsely and confluently punctate.

The one specimen before me was in the first Jacoby collection marked *pellucida* Klug. The excavate front is different from any other form known to me. *Coelocephala* Lac. has an excavate head, and *schottii* Koll. has its vertex excavate, but neither approaches the present form. I place this species for the present in Lacordaire's 16th group.

Chlamys jatahyensis nov. sp. Stout, head and thorax yellow (the latter sometimes spotted with black), the elytra velvety black with a silken gloss, having in certain side lights a greenish or purplish tinge, pygidium and abdomen yellow, rest of the body below and legs black, the latter obsoletely yellow spotted on the thighs; prosternum punctured, abruptly narrowed at the middle to a thin edge; length 4½–5 mm.

Type.—♂; Jatahy, Goyaz; two ♂ and ♀ specimens.

Head thickly punctate, antennae short, 2d joint obconic, 3d and 4th about equal and cylindrical, very gradually enlarged, beginning with 5th, last five joints dark, thoracic hump very moderate, declivous behind, the edge forming a feeble crest which shows on its edge the beginnings of about three obsolete tubercles, like *echinata* Klug. only very feeble, the median sulcus is very feeble and becomes obsolete on the front; the basal sulcus is feeble and the lateral tubercle obsolete, the punctuation is almost uniform and dense over the entire surface, the thoracic spots vary in the two specimens, the ♂ has the following black spots, declivity of the hump on each side of the sulcus, triangular in shape, two series of three round dots each placed transversely, the middle one on the line of the sulcus and the rear one connected by a narrow line with the elytra; the ♀ shows only obsolete traces of about three or four of the round dots, the usual elytral lines are broken into a set of medium tubercles and

lines, of which the most prominent are a basal sutural, and another behind it, a basal median, a rather broken oblique line from the humerus to the middle, ending in a transverse tubercle directly behind the sutural, and two or three moderately prominent costiform ones at the apex, the intervals are strongly punctate, most prominently behind; the velvety appearance is most marked in the discal part, the suture is dentate, pygidium coarsely confluently punctate with a deep elongate lateral fovae.

I place this form near *venusta* Lac. Its colors are very marked and prominent.

Chlamys capitata nov. sp. Oblong quadrate, opaque black, head, antennae, mouth parts and legs rufous, a spot in the vertex and clouds on the legs brown, thorax thickly punctate, with a large side tubercle and deeply sulcate gibbosity, marked in front somewhat after the manner of *scrofa* Lac. Elytra rather sparsely and coarsely punctate, with broken elevated lines not prominent; pygidium tricarinate; prosternum wide in front, gradually compressed to a sharp point behind; length 3½ mm.

Type.—♂; Hā Lang (Lamey), China; two ♂ specimens.

Head slightly convex, shiny, punctate, a slight depression on the vertex occupied by a dark spot, antennae with 2d joint globular obconic, joints 3 and 4 elongate and cylindrical, club beginning with 5th joint and loosely articulate, transverse, thorax moderately punctate, gibbosity declivous behind at an angle of about thirty degrees, sulcate starting from the rear margin, narrow and rather vague, becoming wider and deeper to the apex, and then gradually fading away in front, its side ridges break at the apex and split into elevated lines, the median one becoming antelateral, looked at from behind the ridges show as two tubercles, the side of the gibbosity shows a moderate swelling, and there is a well defined lateral hump. Elytra with about the same lines as *setosa*, but not as well marked or as prominent, suture finely dentate in its posterior two-thirds, abdomen finely punctate with an ill-marked side tubercle, the three carinae of the pygidium are nearly entire, the lateral ones excurved at the top. The distinguishing features are the red head and structure of the antennae.

Chlamys hanoiensis nov. sp. Quadrate cuneate, bronzed, labrum, antennae, except apex, legs partially, two small spots on the rear edge of the head and a large spot on the front of the thorax, luteous, thorax very closely punctate (except sparser and finer on the luteous spot), strongly gibbose in the middle and faintly tuberous at the side; elytra deeply punctate, the punctures arranged obsolutely in rows on the disk, pygidium tricarinate; prosternum abruptly narrowed aud compressed in its rear half; length 3¼ mm.

Type.—♀; Hanoi, Tonkin; one specimen.

Head nearly flat, rugosely punctate, antennae with 2d joint obconic and pointed within, 3d and 4th small cylindrical, remainder transverse, thorax with a strong gibbosity which is almost perpendicular in front, moderate behind, well marked about the base by the side sulcus, which shows as a smooth crease at the rear sides, the sides of the median sulcus begin as an obtuse ridge behind and rise to a small tubercle: then the depression becomes evident and well marked, and continues until it impinges upon the yellow spot in front; at the apex the side ridge forks and sends a small ridge to either side, which small ridge forms the tip of the side elevation, the lateral tubercle is obvious but not strong, the elytra show no scutellar ridge, only two minute tubercles. There are two good sized tubercles along the suture, the first median, the second apical and costiform; these are connected by a low smooth ridge, the antehumeral ridge is shown as a similar smooth line, connecting the tubercles, one basal, the second behind the shoulder, the others broken in the apical region. There are also broken remains of a subhumeral ridge ending in a well marked apical tubercle, the smooth connecting line shows best looked at sideway on the disk, median carina of the pygidium fine and sharp, abdominal side tubercle almost absent.

Chlamys yunnana nov. sp. Oblong quadrate, almost parallel, bronzed, slightly shining above, below with a faint blackish tint, antenna, except apex, labrum and tarsi, flavous; thorax with median sulcus almost entire, two divergent carinae on either side; a strong lateral tubercle; elytra with the usual lines much broken into fragments and tubercles; pygidium tricarinate, the lateral carinae obsolete at the lower ends; prosternum with sides parallel in anterior third,

abruptly narrowed in the middle third and compressed to a thin line in the rear third; length 3 mm.

Type.—♀; from Yunnan; three ♀ examples.

Front thickly, finely punctate, vertex slightly longitudinally depressed, antenna short and stout, the 2d joint stout trigonate, 3d and 4th equal and cylindrical, the remaining transverse and forming a moderately compact club, thorax thickly punctured, coarsely at sides, gibbosity, strongly rounded, almost perpendicular in front and behind, basal sulcus obsolete, the median sulcus moderately wide and marked with parallel ridges or carinae, which nearly attain both base and apex, of the two lateral carinae on the gibbosity, the external is short and broken and forms the upper edge of the rear declivity. The internal leaves the median carina at the apex of the gibbosity, swings out in a short curve and descends towards the anterior edge in a line diverging from the median, elytra moderately strongly punctate, the usual lines very faint, appearing to be broken into short pieces and tubercles, none being particularly prominent, a line of about five tubercles shows parallel to the suture, the first basal, the last apical semi-costiform, below coarsely punctate, the sides of the abdomen with a large and small tubercle, the latter at the rear.

Chlamys setosa nov. sp. Black, slightly bronzed, thorax rather thickly, elytra very sparsely clothed with very fine yellow setae, form robust quadrate, slighty narrowed behind; antennae, labrum and legs dilute brown gradually shading into blackish; length 4 mm.

Type.—♂; Yunnan.

Head rugosely and coarsely punctured, vertex with a well defined sulcus, antennae long and slender, 2d joint globular, 3d very shortly trigonate, the remaining joints transverse and loosely articulated, thorax rough with small humps and lines, and finely punctured, obsoletely strigose in places, the setae giving the surface a yellowish look, especially at the anterior sides, the middle occupied by a well developed hump which is sharply declivous behind and limited at the sides by the usual side groove, the median sulcus starts from the rear edge, narrow, deep and parallel, attaining the top of the rear

declivity it rapidly widens, until about where it descends in front, it narrows and reaches the anterior edge in two broken lines, at the point of widest expansion the sides are broken and send a slight line internally; the sides of the declivity have a large broken tubercle between the base and apex, laterally there appears a large prominent tubercle. There are about three or four short elevated lines near the anterior front, nearly attaining the margin, these lines resemble the markings in *C. scrofa* Lac.: the elytra are truncate behind, coarsely and transversely semi-confluently punctate, with raised semi-circular line from the base around the scutel and not attaining the suture, another beginning with quite a prominent tubercle in the middle of the base and parallel to the first, then with a sharp transverse ridge inwards and another sweep ending in another ridge which nearly attains the suture about its middle, a humeral line which is broken after the middle. The rear is occupied by about six tubercles, of which the most prominent are the two apical, one costiform near the suture, the other dentate lateral, suture dentate, the first segment of the abdomen has two lateral tubercles, one sharp, covering the end of the femoral cavity, the other large and flattened, surface coarsely reticulately punctate, pygidium shining, sparsely punctate, median carina fine, lateral in the form of a reversed S, with a faint median connection, prosternum scarcely compressed, almost regularly triangularly narrowed from front to rear.

A Brief Review of our Species of MAGDALIS, with Notes and Descriptions of other North American Rhynchophora.

BY H. C. FALL.

MAGDALIS Germ.

The following notes are the result of an attempt to separate in my own collection the species of this genus having simple claws. A small number of specimens have been contributed or loaned for study by Dr. Van Dyke, Mr. Frederick Blanchard, Mr. C. A. Frost and Mr. Percy G. Bolster, but the conclusions reached have been based for the most part solely on my own material. Some of these conclusions I have held to be in a measure tentative, but in this connection it is gratifying to add that an examination of upward of 500 specimens from the National Museum and Forestry Collections, which unexpectedly came to me shortly after the completion of this manuscript, has left the systematic conclusions virtually unchanged. This large collection has furnished, however, a considerable number of localities and some interesting biological data.

The group of forms in the vicinity of *gentilis* is particularly puzzling and troublesome, owing perhaps to the greater or less instability of many characters generally useful in determining species. Certain individuals tend to bridge the gap between this species (*gentilis*) and some of the assumed varieties of *lecontei*, and a more thorough study of long series from many localities, coupled with a knowledge of life histories is needed here.

In the following descriptions length of body is measured from the base of the beak to the tip of the elytra; the point of antennal insertion is taken as the anterior basal extremity of the scape at the point of junction with the ball and socket joint.

The types of all the new species described in this paper are in my collection.

Our species may be primarily grouped as follows:

Antennal club normal in both sexes.

Femora not toothed, the anterior ones obliquely impressed at base on the posterior face ; hind angles of thorax feebly produced and scarcely at all everted.....Group CUNEIFORMIS.

Femora toothed, not impressed at base ; hind angles of thorax more or less produced and divergent. .....Group LECONTEI.

Antennae inserted approximately at basal two-fifths of the beak in the ♂, and at basal one-third in the ♀.

Subgroup *lecontei*.

Antennae inserted at or slightly behind the middle in the ♂, a little more posterior in the ♀, usually at or near basal two-fifths.....Subgroup *gentilis*.

Antennae inserted distinctly beyond the middle in the ♂, and at about the middle in the ♀.....Subgroup *alutacea*.

Antennal club in the ♂ greatly elongate and thickly clothed with erect pile..... .....**barbicornis.**

Group CUNEIFORMIS.

Blue, moderately shining, first and second funicular joints subequal, the first not much stouter. Length 5½–8 mm..**cuneiformis.**

Black.

Elytral intervals wider than the striae, except occasionally in *hispoides*.

First and second funicular joints subequal, the first not or scarcely wider than the second ; strial punctures of elytra smaller, intervals perfectly flat and nearly three times as wide as the punctures at middle of disk ; body beneath densely punctate. Size large, 6 mm.....**morio.**

First funicular joint much stouter than the second ; strial punctures of elytra larger, the intervals flat or slightly convex and from one to two times as wide as punctures at middle of disk ; body beneath rather sparsely finely punctate ; size smaller, 3–4½ mm.....**hispoides.**

Elytral intervals narrower than the striae ; punctuation coarse ; size 4½–5½ mm.....**perforatus.**

Group LECONTEI.

Subgroup *lecontei*.

Size larger, 3½–7 mm. ; color typically rather brilliant blue or blue-green.....**lecontei.**

Color purpureo-violaceous, varying to green.....var. **superba.**

Color black throughout .....var. **tenebrosa.**

Color black, elytra dark blue or bluish-black...var. **tinctipennis.**

Size smaller, 3–4 mm. ; black throughout, or with the elytra faintly bluish.

Prothorax strongly convex, beak longer and more arcuate, elytra faintly bluish, moderately shining, intervals narrow, convex. **convexicollis.**

Prothorax normally convex, beak less strongly arcuate, color black, lustre dull, elytral intervals flatter and more rugose. **austera.**

Prothoracic punctures more or less longitudinally confluent, elytra with dark blue or greenish lustre.....var. **substriga.**

Subgroup *gentilis.*

Femoral tooth obtuse, rudimentary, antennae (♂) inserted very slightly behind the middle of the beak, second funicular joint much less than twice as long as wide.....**vitiosa.**

Femoral tooth acute, well developed.

Elytral striae lightly or scarcely impressed, the intervals nearly flat.

Beak in ♂ fully as long as, and in the ♀ distinctly longer than the prothorax.....**gentilis.**

Beak in ♂ evidently shorter than, and in the ♀ subequal in length to the prothorax; eyes a little less distant; entirely black, surface duller and more rugose.....**proxima.**

Elytral striae rather strongly impressed, the intervals distinctly convex.....**striata.**

Subgroup *alutacea.*

Black, opaque, head rather sparsely punctate; antennae (♀) inserted at the middle of the beak, funicle more slender...**alutacea.**

Reddish-brown, opaque, head very densely punctured, antennae (♀) inserted distinctly beyond the middle of the beak, funicle stout.....**imbellis.**

M. cuneiformis Horn.

The type of this species is from Nebraska and is in the Ulke Collection. At the time of its description by Horn no other specimens were known, but there are now in his collection examples from Colorado, Montana and Washington. Snow records it from New Mexico, and my own specimens were taken in the San Bernardino Mountains of California. Horn merely says in his description "surface blue," but in all examples known to me (I have not seen the type) the prothorax is nearly or quite black, the elytra dark blue. It is worthy of remark that in all the specimens examined the

hairs of the under surface are entirely simple, even upon the episterna, which are so often clothed with radio-pectinate hairs in this genus.

M. morio n. sp.—Rather strongly cuneiform black throughout, lustre dull, above glabrous, beneath with sparse fine hairs, a few of which become radio-pectinate on the sternal side pieces. Beak (♂) evenly moderately arcuate, three-fourths as long as the head and prothorax, evenly rather closely punctate, a short smooth line above the insertion of the antennae, Antennae inserted at basal three-sevenths, scape reaching the eye, first and second funicular joints subequal, each a little less than twice as long as wide, the second about as long as the third and fourth together. Head moderately punctate, a small fovea or impressed puncture between the eyes, the latter rather flat and separated by about three-fourths the width of the beak. Prothorax conical, as wide at base as long, sides nearly straight, suddenly constricted at apex, surface densely rather coarsely punctate, without trace of median impunctate line. Elytra gradually widening to apical third, where they are one-half wider than the greatest thoracic width; strial punctures rather fine, striae not impressed, intervals wide, flat, interstitial punctures fine, forming a single line on the eighth interspace, more or less irregular or double on the others. Body beneath densely punctured. Length 6 mm.

Santa Rita Mountains, Arizona (Snow); Chiricahua Mountains, Arizona (Hubbard and Schwarz); Magdalena Mountains, New Mexico (Snow).

The type is a ♂ from the first named locality, and has the abdomen concave at base, the median portions of the last three or four segments clothed with numerous short erect hairs.

It differs from *cuneiformis* by its color, dull lustre, finer less impressed elytral series and wider intervals.

M. hispoides Lec.

This species is quite out of place in the Check List, doubtless because Le Conte in his description made no comparisons with older forms; the simple femora and claws, however, at once declare its position. It is very widely diffused, occurring from Maine to British Columbia (type locality) and extending down into New Mexico and California. Some variation exists as might be expected in so wide a range, the Californian specimens showing a tendency toward a

greater width and convexity of elytral intervals than in the more northern and eastern specimens.

The species is known to me from Kineo, Maine; White Mountains, New Hampshire; Brookline, Mass.; Port Huron, Mich.; "Canada;" Porvenir, New Mexico; British Columbia, and Lake Tahoe, California. Ulke records it in his District of Columbia List as occurring on pines. The species referred to by Bowditch in his Mt. Washington List as "n. sp. near *hispoides*," and that taken by Schwarz at Garland and Veta Pass, Colorado, and listed by Le Conte as "sp. near *hispoides*" will, I suspect, prove to be no more than slight variations of this wide spread species.

M. perforatus Horn.

A well known species, easily recognized by its very coarse, deep, dense sculpture, with unusually narrow elytral interspaces. The antennae are said by Horn to be median, but are really post-median in both sexes, as in all the species of this group.

It occurs all the way from New Hampshire to Georgia (type locality). There is a Michigan specimen in the Horn Collection, and it is recorded in Wickham's Iowa List.

M. lecontei Horn.

Several distinct species are included under this name in collections, those in my own collection being easily differentiable by the characters in the preceding table. Of these the true *lecontei* is much the largest, specimens under 4 mm. in length very rarely occurring, while this size is seldom if ever attained by any of the allied species. *Lecontei* is rather common in the Rocky Mountains and westward, but does not, so far as I know, cross the plains to the east. Horn in his description says "Kansas to Oregon and California," and it would be interesting just now to know the precise locality and identity of his Kansas specimens.

Aside from the very obvious differences in size and color, two other characters may be mentioned which separate *lecontei* from other species of this group. The second funicular joint is unusually elongate, being fully twice as long as

wide and as long as the two following. The lengths of the funicular joints are subject to a little individual variation, and occasional specimens may prove disconcerting; the difference is, however, perfectly obvious in a series. Again, the elytral interspaces in males of *lecontei* and in both sexes of the related species show a single line of interstitial punctures with rarely any marked tendency toward irregularity; in females of *lecontei*, however, the interspaces are unusually wide, the interstitial punctures small, and on several of the intervals form confused or double lines.

Three color varieties are thought worthy of distinctive names.

Prothorax dark purplish-blue, elytra violaceous, varying to entirely brilliant green.....**superba** new var.
Color entirely black .....**tenebrosa** new var.
Black, elytra dark blue or bluish-black.....**tinctipennis** new var.

The former (*superba*) is known to me from Arizona (type ♂ from Prescott), the second (*tenebrosa*), type sex doubtful, from Porvenir, New Mexico, Colorado and California; the last from Cloudcroft, New Mexico, and Williams, Arizona. Of these *tinctipennis* is most aberrant, and may possibly prove distinct; there seems, however, to be a gradual approach to the typical form.

M. convexicollis n. sp.—Smaller and a little narrower than *lecontei*, cuneiform, black, the elytra bluish, moderately shining. Beak (♂) longer than the prothorax, strongly evenly curved, punctured as in *lecontei*. Antennae inserted at basal two-fifths of the beak, second funicular joint distinctly less than twice as long as wide and shorter than the two following together. Prothorax strongly longitudinally convex, fully as long as wide, sides broadly nearly evenly rounded, not much more strongly so in front; apical constriction feeble, surface densely rather coarsely punctate without trace of smooth median line. Elytral striae well impressed, intervals rather narrow and convex, each with a single line of moderately strong punctures. Body beneath as in *lecontei*, the hairs more uniformly compound. Femoral tooth acute but not large. Length 3¼ mm.; width 1.35 mm.

Type.—♂; San Bernardino Mountains, Southern California; 5000 feet.

Easily separable from *lecontei* by the small size, somewhat narrower form, more convex thorax, which is less narrowed anteriorly, short second funicular joint and more strongly impressed elytral striae, with narrower more convex intervals. The smooth median prothoracic line is very rarely entirely lacking in *lecontei*.

M. austera n. sp.—Dull black, elytra rarely with faintest suspicion of blue, prothorax wider than long, apical constriction strong, surface densely punctate, without or with but slight trace of short median smooth line; elytra parallel or nearly so in the ♂, a little widened behind in the ♀; striae of coarse oblong punctures, scarcely or feebly impressed, intervals nearly flat with single lines of rather coarse interstitial punctures; femoral tooth small but acute. Length 3–4 mm.

The type of this species is a ♂ from Ridgeway, Ontario, sent me many years ago by Mr. A. H. Kilman. Other examples before me are from "Canada;" Maine (Monmouth—Frost); New Hampshire (Farmington); Massachusetts (Concord and Framingham); Michigan (Marquette, Detroit, Port Huron); North Carolina (Retreat); New York; Ontario (Toronto).

The small size, dull black or nearly black color, with relatively rougher surface sculpture, and more parallel elytra separate this species from typical *lecontei* easily enough.

The following form in typical specimens differs so much from typical *austera* as to present the appearance of a distinct species, which, indeed, I at first supposed it to be. With increased material intermediate forms turned up, and with present light I can give it varietal standing only.

M. austera var. **substriga** n. var.—Black, elytra dark blue or greenish, moderately shining, evidently but not strongly widened posteriorly. Prothorax closely punctate, the punctures becoming more elongate toward the middle, where they are more or less conspicuously longitudinally confluent. Second funicular joint less than twice as long as wide and shorter than the two following united; elytral striae evidently impressed, but with the intervals nearly flat, and with single series of moderately coarse interstitial punctures. Length 3.2–4 mm.

Massachusetts (Tyngsboro—type, ♂, Dover, Brookline); New York (Peekskill).

The strigose or substrigose prothorax primarily separates

this variety from typical *austera*. In addition, the elytra seem to have normally a distinct blueish or greenish lustre, to be rather more widened posteriorly and to have the striae more evidently impressed. The form of body is nearly the same as in *lecontei*, but the size, color, shorter second funicular joint, more evidently impressed striae and single regular series of larger interstitial punctures in the ♀, are quite sufficient for its separation, even if the locality label is not conclusive—as seems probable.

M. vitiosa n. sp.—Black, lustre dull, elytra a little wider behind in the ♂, distinctly so in the ♀. Beak subequal in length to the prothorax (♂), slightly longer (♀), moderately arcuate, closely rather coarsely punctate. Antennae inserted slightly behind the middle, second funicular joint short, obviously less than twice as long as wide. Prothorax a little wider than long, sides subparallel in basal half, rounded anteriorly with a moderate apical constriction; punctuation dense, without or with but slight trace of smooth median line near base and apex. Elytral striae scarcely impressed, intervals nearly flat and with single series of rather coarse interstitial punctures. Femoral tooth rudimentary, nearly obsolete on the hind thighs. Length 3.1–3.3 mm.

Type.—♂; Lake Tahoe, California.

M. gentilis Lec.

This species was described from two examples collected by Crotch at Lake Tahoe. The type is a ♂, 4 mm. long, and differs from *vitiosa* in having the elytra blueish and evidently smoother and less dull, thorax with entire smooth median line, the femoral tooth large. The second example is apparently a ♀, considerably smaller and possibly not identical with the ♂ type. The second funicular joint is not quite twice as long as wide in the type and is still shorter in the smaller ♀, in which it is nearly as in *vitiosa*. The relative dimensions of the antennal joints are, however, subject to some individual variation and are not to be depended on except in series. I am placing as *gentilis* provisionally a number of examples taken by Dr. Fenyes at Lake Tahoe, which have the second funicular joint more slender, nearly or quite twice as long as wide, but which agree fairly well with the type in nearly all other characters. I am also com-

pelled to place here for the present sundry examples from other regions, namely, specimens from Paris and Kinco, Maine, collected by Frost and Fenyes respectively, a ♂ from Fitzwilliam, New Hampshire (Blanchard), a ♂ from Mt. Washington, New Hampshire (Dimmock), and a ♀ from Greenbush, Saskatchawan, contributed by Mr. T. N. Willing and bearing the name *subtincta* and the legend "emerged from spruce Apr 13 '06." These examples exhibit more or less trifling differences from typical *gentilis* and from each other, but it is absolutely impossible to define them specifically with the limited material at hand.

M. proxima n. sp.—Black, surface lustre dull, elytra feebly widened behind in the ♂, distinctly so in the ♀. Beak (♂) short, scarcely as long as the prothorax, antennae inserted very near the middle; in the ♀ the beak is subequal in length to the prothorax, with the antennae inserted about two-fifths from the base. Second funicular joint scarcely twice as long as wide and rather shorter than the next two. Prothorax densely punctate, smooth median line very narrow but entire or nearly so. Elytral striae scarcely or but feebly impressed; interstices nearly flat, for the most part with single regular series of moderately coarse punctures. There is a little tendency to irregularity on the second and third interspaces; on the first and ninth the irregularity is obvious, as it is to a greater or less extent in all the species here considered. Femoral tooth moderate. Length 3.6–4.2 mm.

Type.—♂; from Santa Clara County, California (C. F. Baker); Humboldt County, California (H. S. Barber).

The eyes in the male type are separated by scarcely more than two-thirds the width of the beak. In *gentilis* the distance is a little greater, about three-fourths the width of the beak so far as observed.

M. striata n. sp.—Black, moderately shining, gradually wider behind. Beak as long as the prothorax in the ♂, closely punctate, with the antennae inserted just behind the middle. In the ♀ the beak is a little longer and less densely punctate, the antennal insertion at about the basal two-fifths. Second funicular joint nearly twice as long as wide, but scarcely as long as the next two. Prothorax densely punctate, median smooth line sometimes entire, usually more or less imperfect, and occasionally nearly wanting. Elytral striae rather deeply impressed, the oblong punctures in consequence ill-defined. Intervals convex, coarsely uniseriately punctate. Length 3½–4 mm.

Type.—♂. Described from a good series taken on Mt. Wilson in southern California.

This, by the more shining and uniformly rather deeply striate elytra is the best characterized species of the *gentilis* group. As in *proxima* the eyes in the ♂ are separated by scarcely more than two-thirds the width of the beak, and thus make an approach to *alutacea*, in which the approximation is still closer. In the ♀ of *striata* the eyes are distant about three-fourths the rostral width, the sexual disparity in this respect being rather better marked than in any other of the allied species.

E. alutacea Lec.

Beak in the ♂ stout, alutaceous and opaque, a little wider beyond the base of the antennae, which is at about the apical third. In the ♀ the beak is more slender, less dull, the antennae inserted at the middle. The eyes are less widely separated in the ♂ than in any species of the preceding groups, their distance apart being about one-half the width of the beak in the ♂ and three-fourths in the ♀. In all the preceding species the eyes are separated by approximately three-fourths the width of the beak in both sexes, the sexual disparity being at most but slight. In *striata* and *proxima* the eyes seem to be a trifle closer than in the other species of the subgroup. Le Conte's description of *alutacea* is based upon two specimens, both ♀'s, one from the Colorado Rockies, the other from Isle Royal, Lake Superior. The first named bears the label and is to be considered the type. It is alutaceous with a rather smooth silky lustre (under low power), the elytral intervals rather wide and flat, the striae unimpressed. In the Isle Royal specimen the striae are slightly impressed, thus approaching somewhat *gentilis* in appearance. In some examples from California and Oregon the striae are obviously a little impressed and the sculpture rougher, but these variations are gradual and not confined to particular regions. From *gentilis* and from black examples of *lecontei* (var. *tenebrosa*), *alutacea* may in the absence of ♂'s be distinguished by the relatively longer and more slender basal joint of the hind tarsi. The much more

basal insertion of the antennae in ♀'s of *lecontei* will, of course, make separation easy, but in ♂'s of *lecontei* and especially in *gentilis* this difference is less marked.

In distribution as well as in degree of interspecific variation, *alutacea* rather closely parallels *hispoides*. Examples are known to me from New Hamphire, Lake Superior, Rocky Mountain region from Alberta (Bannf) to New Mexico at altitudes of 9000 to 11,000 feet in Colorado and New Mexico, British Columbia (Emerald Lake); Vancouver; Oregon (Portland) and California (Lake Tahoe, Kings River and Santa Monica).

M. imbellis Lec.

A single ♀ from Sonoma County, California (Van Dyke Collection), is before me. The type—a unique ♀—was from Oregon. The species may be at once known by the tabular characters. In the specimen at hand the third and fifth elytral intervals are wider.

M. barbicornis Latr.

This European species is included on the basis of a specimen from Long Island (New York) in the Linell Collection, and a small series taken on elm at Dorchester, Mass., by Mr. Percy G. Bolster of Boston. The latter specimens have been taken recently (June, 1909), but the Linell specimen must have been found many years ago. The ♂ of *barbicornis* (I have not seen the ♀) is at once known by the dense erect pile of the antennal club and two outer funicular joints, the club itself very elongate—as long as the entire scape and funicle. The beak is short and stout, about as long as the head, dilated beyond the antennal insertion which is at about the middle of its length; thighs not toothed; size rather small.

The species of *Magdalis* with toothed claws are less numerous than those with simple claws and will not now be treated at length; the following notes, however, may be of service, and will probably be sufficient for their separation. Of the nine species known, six occur in the eastern United States,

and three on the West Coast, one of which ranges as far east as Montana, Colorado and New Mexico.

Of the western species—*gracilis*, *aenescens* and *subtincta*—the first two are distinguished by the very densely punctate thorax and the obvious pubescence of the upper surface, the scutellum quite densely clothed. They are very closely allied, and dependence seems to have been placed entirely on the aeneous surface lustre of *aenescens*. This is feeble or entirely wanting in some specimens, which then are not distinguishable with certainty from *gracilis* by any characters that I can discover. In general it may be said that the elytral striae are less deep and the intervals less convex toward the suture, with a slight tendency to alternation in convexity posteriorly in *aenescens*, but these characters fail more or less completely in some examples. In *gracilis* the striae are uniformly deep, the intervals convex and uniform so far as I have observed. *Aenescens* occurs from southern Alaska to northern California. *Gracilis* is found in the vicinity of San Francisco and also in western Nevada if I have correctly referred a number of specimens taken at Reno by Professor Wickham.

Subtincta differs from the two preceding by the more coarsely and less densely punctured thorax, and in none of the specimens at hand is there any obvious pubescence on the upper surface. The type locality is Gilroy, California, a little south of San Francisco, but the species is quite widely dispersed. It is known to me from many localities in California; from Oregon; Washington; Vancouver Island (Victoria); Montana (Kalispell); Colorado and New Mexico (Pecos and Poñil Cañon). Specimens taken by me on alders in the San Bernardino Mountains of California are evidently more shining than the type, but the differences seem to me no more than racial. In a Pasadena specimen the elytra are faintly greenish, in others there is a barely perceptible bluish tint, but the majority, including the type, are black or very nearly so.

Of the eastern species *olyra* is easily known by the distinct ochreous pubescence of the upper surface, the densely pubes-

cent scutellum, and in the great majority of specimens by the testaceous or piceo-testaceous antennae, tibiae and tarsi.

Pandura and *inconspicua* are small species with broad head and relatively sparsely punctured thorax, elytra rather conspicuously dilated posteriorly; black throughout with dull lustre. They are very similar to each other, but differ by the hind angles of the prothorax, which are broadly laminiform in *pandura*, much less expanded in *inconspicua*. In *pandura* the elytral intervals are typically flatter than in *inconspicua*, but this character is apt to fail; the surface lustre is also somewhat duller as a rule.

In the remaining species—*salicis*, *barbita* and *armicollis*—the head is elongate conical and the prothorax densely punctate. *Salicis* is the smallest of the three, and differs from the others in its non-protuberant mesosternum. The scutellum is not densely pubescent, the abdomen similarly punctate in the sexes and the antennal scape attains the eyes.

Barbita and *armicollis* are as a rule much larger, though some males are very small. Both have the mesosternum protuberant, though Horn indicates this only for *barbita*, in which it is usually rather more pronounced. *Barbita* is entirely black with densely pubescent scutellum, and abdomen normally and similarly punctate in both sexes. The antennal scape lacks much of attaining the eyes in the ♀ and barely reaches them in the ♂.

Armicollis is black with reddish or yellowish-brown elytra in the ♂, while the ♀ is entirely reddish-brown; the scutellum is not distinctly pubescent, the antennal scape nearly attains the eyes in the ♀, and passes their anterior margin in the ♂. This species differs from *barbita*, and in fact all our other species of the genus, in having the abdomen of the ♂ polished and impunctate along the middle, the smooth stripe limited on each side by a thin fringe of rather long and fine erect hairs. The terminal segment in this sex is truncate at apex with well defined though obtuse limiting angles.

The distribution of the eastern species is as follows so far as known to me.

Olyra.—New England States and Canada to Minnesota, and south to North Carolina and Missouri.

Pandura.—Massachusetts and Ontario to Wisconsin, and south to Missouri and Georgia.

Inconspicua.—Massachusetts and Ontario to Dakota and south to Pennsylvania, Ohio, Missouri and Texas.

Salicis.—Massachusetts and "Middle States" (Horn).

Barbita.—New England—Canada—to Dakota, and south to Georgia, Kentucky and Texas.

Armicollis.—Same as *barbita*.

Biological Notes.

The following data accompanied the National Forestry Collection.

Cuneiformis var.—On *Pinus ponderosa*, Ft. Garland, Col., June 14, '06, bred June 15, '07.

Cuneiformis var.—On *Pinus echinata*, Hampton, Ark., bred Mar. 25, '07.

Lecontei.—On *Pinus lambertiana*, Mariposa Grove, Cal., June 11, '04; Summerdale, Cal., July 7, '06.
Pinus.—Centerville, Id., July 28, '05; bred Apr. 7, '06.

Lecontei var. **superba.**—Catkin of *Pinus ponderosa*, San Francisco Mts., Ari., May, 26, '04. On *Pinus ponderosa*, Flagstaff, Ari., May 28, '04; Vermejo, New Mex., Aug. 24, '04.

Austera.—*Pinus strobus*, Ottawa, Can., Aug. 8, '05, bred Mar. 8, '06; Webster, N. H., Oct. 12, '06, bred Feb. 16, '07.
Pinus.—Tryon, N. C., Apr. 11, '06, bred May 25, '06.

Austera var. **substriga.**—*Pinus strobus*, Webster, N. H., Oct. 12, '06, bred Feb. 16, '07.

Gentilis?—*Pinus jeffreyi*, Bishop, Cal., Oct. 4, '09, bred Feb. 14, '10.

Gentilis?—*Picea canadensis*, Camp Caribou, Me., June 11, '00.
Picea.—Camp Caribou, Me., May 28, '00.

Proxima.—*Pinus radiata*, Palo Alto, Cal., May 19, '06.

Alutacea.—*Picea engelmanni*, Clyde, Col., Oct. 9, '05, bred Mar. 26, '06, to Aug. 15, '06.

Aenescens.—*Pyrus*, Corvallis, Or., Apr. 29, '99. *Alnus.*—Hoaquim, Wash., June 23, '03.

Pandura.—*Juglans nigra*, Kanawha Sta., W. Va., May 4, '05, bred Nov. 14, '05.

Inconspicua.—*Hicoria*, W. Va.

Olyra.—*Hicoria*, Kanawha Sta., W. Va., bred May 9; Milford, Pa., May 11; Tryon, N. C., July, '05, and Apr., '06.

Barbita.—*Alnus americana*, State College, Pa., Apr. 11, '10.

Armicollis.—*Ulmus*, Emporia, Kan., Oct. 3, '06, bred Apr. 10, '07.

TRICHOMAGDALIS new genus.

Very similar in general aspect and general structure to *Magdalis*, differing as follows: Upper surface moderately to rather densely pubescent, form more cylindrical, the elytra not at all widened posteriorly; beak straight, much shorter than the prothorax, the latter strongly convex in profile, the hind angles not produced or expanded; elytra transversely impressed before the apex; fifth ventral segment as long as the two preceding or nearly so. The claws are simple and the femora unarmed, as in some species of *Magdalis*.

Three Californian forms are known to me, all apparently very rare. The first to be described (*fasciatus*) may be regarded as the type of the genus, but they are perfectly homogeneous in all essential characters.

T. fasciatus n. sp.—Brown, integuments rugose and dull, rather densely clothed above with coarse recumbent hair, which is bright red-brown on the elytra, orange-red at the anterior margin of the prothorax; the basal half of the prothorax, base of elytra about the scutellum and beneath the humeral umbone, a transverse median fascia wider at the side margins, a lateral anteapical spot, and the apex whitish cinereous; pubescence beneath whitish, the posterior half of the abdomen orange-red with some pale hairs intermixed, chiefly at the middle and sides. The white hairs of the under surface and those on the posterior parts of the pronotum are fine and conspicuously plumose. Beak rather stout, two-thirds as long as the prothorax, nearly straight, gradually widened apically, coarsely densely punctate and glabrous. Antennae inserted at about the apical two-fifths, scape curved, barely reaching the eye, first and second funicular joints about twice as long as wide, the second a little shorter and narrower than the first, third to seventh gradually shorter and slightly wider, the seventh a little transverse; club cylindro-conical, as long as the five preceding joints. Eyes not very convex, separated by a distance equal to two-thirds the width of the beak at apex; a frontal puncture between the eyes. Prothorax as wide as long, sides strongly rounded, widest at middle, feebly constricted anteriorly, basal margin narrowly reflexed at sides; surface densely but not coarsely rugose-punctate. Legs moderately stout, femora nearly simple, tibiae strongly unguiculate at apex, the outer angle also of the front tibiae produced in a short acute spur; tarsi as long as the tibiae, penultimate joint bilobed; claws small, simple. Length, 4–4.5 mm.; width, 1.6–1.8 mm.

California: Pomona; Santa Monica; vicinity of San Francisco.

The type, and only example ever taken by me, was beaten from scrub oak in San Dimas Cañon near Pomona, April 30, 1892. A second example was taken at Santa Monica by Mr. Max Albright, from whom I received it. I have also seen an example in Dr. Blaisdell's Collection and another in that of Dr. Van Dyke, both taken near San Francisco.

T. consperus n. sp.—Narrow, cylindrical, black, upper surface mottled with coarse fawn colored appressed hairs which are so arranged on the pronotum as to leave the median line and a lateral spot each side subglaborus, and on the elytra are irregularly dispersed in small condensed areas; vestiture beneath of the same color as above, the hairs broadly plumose except on the last three ventral segments and toward the anterior margin of the flanks of the prothorax. Beak about three-fourths as long as the prothorax, less densely and rugosely punctured than in the preceding; antennæ inserted slightly behind the middle. Last ventral shorter than the two preceding; all else nearly as in *fasciatus*. Length, 5 mm.; width, 1.85 mm.

Type.—From Sylvania, California, April 4th. A single specimen received from Mr. L. E. Ricksecker. There are also single specimens in Dr. Blaisdell's and Dr. Van Dyke's Collections, taken near San Francisco.

The slightly longer and smoother beak and more posteriorly inserted antennae, with the shorter fifth ventral indicate that the type—and I think also the other two specimens—are females, and it has been suspected that this may be the ♀ of the preceding species. There is, however, no direct evidence to that effect, and if it should so prove, will constitute an instance of sexual disparity in color and arrangement of vestiture quite unparalleled among the Rhynchophora.

T. atratus n. sp.—Slender, parallel, black, clothed sparsely and uniformly with fine whitish pubescence, the hairs plumose beneath as in the two preceding species. The beak is nearly three-fourths as long as the prothorax, coarsely densely punctate; the antennae inserted a little beyond the middle; the fifth ventral nearly as long as the two preceding. Length, 3.4 mm.; width, 1.3 mm.

Type.—From Alameda County, California.

The unique type is doubtless a male, and differs much from *fasciatus* and *conspersus* in its sparse fine whitish uniformly distributed vestiture. In other respects it agrees with its congeners.

LIXUS Fab.

L. maritimus n. sp.—Rather slender, parallel, black, slightly shining, not densely clothed with short cinereous hair, which is feebly condensed in the usual thoracic vittae, on the third elytral interspace and in a broad sublateral vitta occupying intervals 7–9, but without nucleation at any part. Beak rather slender, nearly as long as the prothorax, at least in the ♀, not densely, finely punctate, with numerous coarser punctures toward the base; a deep fovea between the eyes and a linear one between the antennae. First and second funicular joints equal in length, the first a little stouter. Prothorax nearly or quite as long as wide, sides parallel or very faintly convergent and nearly straight to apical fourth or fifth, then rather abruptly constricted; median line narrowly impressed, a little more broadly and deeply so behind; coarsely and rather closely punctate, the interval finely closely punctulate. Elytra not quite two and one-half times as long as wide, but little wider than the prothorax and not quite three times as long, sides parallel in basal three-fifths, thence gradually narrowed, tip acutely not deeply notched; elytral series not impressed, moderately coarse. Thighs feebly annulate; hind tibiae about three-fourths as long as the femora. Length (exclusive of beak), 6.7–10.4 mm.; width, 1.9–3 mm.

Type.—From Santa Monica, California.

Found about the roots of plants growing on the sand dunes immediately adjacent to the beach. I have long associated this species with *semivittatus* Csy. of Arizona and Utah, to which it is closely similar. The difference in habitat would certainly indicate specific distinction, and a closer study convinces me that this is the case. The chief differences obervable are as follows: There is never any trace of a vitta on the fifth interspace of the elytra in *maritimus*, the other vittae being at best feebly defined and evident only in well preserved specimens. The beak is a trifle longer, the prothorax rather more densely punctured and the tibiae relatively a little longer, being about three-fourths as long as the femora, while in *semivittatus* they are about two-thirds as long.

L. perlongus n. sp.—Very elongate, subcylindrical, black, feebly shining; pubescence yellowish-gray, sparse and short on the thoracic disk, denser in a distinct moderately wide lateral vitta; evenly nucleated throughout on the elytra, somewhat denser laterally but without well defined vitta. Beak cylindrical, moderately curved, not stout, a little longer than the prothorax, not at all carinate, rather finely and closely

punctate, the punctures shallow and more or less confluent longitudinally; a small interocular fovea. Antennae inserted a little beyond the middle of the beak, first and second funicular joints equal, the first scarcely stouter, each equal in length to the third and fourth combined. Prothorax conical, nearly as long as wide, sides very feebly arcuate and regularly convergent from the base; surface evenly convex except for a small feeble antescutellar impression; punctuation fine and not very distinct, with sparser somewhat larger punctures intermixed. Elytra slightly wider than the thorax, three times as long as wide and almost four times as long as the prothorax, sides parallel and straight, humeral angles evident, disk with unimpressed rows of fine subelongate punctures. Legs rather slender, thinly and evenly gray pubescent. Length, 13.5 mm.; width, 3.25 mm.

Type.—From Chiricahua Mountains, Arizona.

A single example of uncertain sex collected and given me by Mr. V. L. Clemence. This species is not very closely allied to any of our previously described species, but will go with those species under "10" in Casey's table. It is more elongate than any other known to me.

L. peninsularis n. sp.—Moderately slender, subcylindrical, black, scarcely shining, evenly rather thinly clothed throughout with very fine, short cinereous recumbent hair, with a few sparse, short, but longer erect hairs visible in profile, especially on the declivity of the elytra. Beak (♂) about four-fifths as long as the prothorax, cylindrical, moderately stout, feebly curved, rather coarsely punctate, with intermixed finer punctures; in the ♀ as long as the prothorax, more slender and shining, with the apical parts finely and sparsely punctate; median line obtusely prominent basally but scarcely carinate, Antennae inserted slightly beyond the middle (♂), or a little behind the middle (♀); first and second funicular joints subequal, each about as long as the third and fourth united. Head with sparse duplex punctuation, closer in the ♂; frontal fovea strong but small. Prothorax subquadrate, a little wider than long, sides just visibly convergent and straight, abruptly constricted near the apex; punctuation rather sparse and coarse, the interspaces finely densely punctulate; basal impression small and feeble. Elytra a little more than two and one-half times as long as wide, just perceptibly wider than the prothorax and about three times as long; humeral prominence very small and obtuse, sides straight and parallel in basal three-fifths, apex feebly narrowly notched, serial punctures moderately coarse. Pubescence beneath a little longer and denser than above. Length, 10.6–11.3 mm.; width, 2.9–3.1 mm.

Type.—♂; from San Jose del Cabo, Lower California (Fuchs); one pair.

Rather closely allied to *maritimus* and *semivittatus*, but differing conspicuously by the perfectly uniform vestiture which shows no trace of condensation at any point, and by the slightly more robust form with the relatively somewhat wider prothorax, with sides more nearly continuous with those of the elytra.

DINOCLEUS Csy.

D. hystrix n. sp.—Oblong oval, not very robust, black, very densely clothed above with nearly white recumbent hair and numerous long fine, erect white setae, which on the elytra are subserially arranged on the interspaces; sides of beak, a broad dorsal thoracic stripe which is narrowed in front and finely divided, an elongate spot on the flanks, and several small elytral spots, subdenuded and blackish. Beak stout, not as long as the prothorax, dorsum flattened with vestiture so dense as to conceal the sculpture, but apparently not or but feebly carinate; front broadly rather deeply concave. Prothorax nearly square, sides straight and parallel to the abrupt apical constriction, the angles not tuberculiform, punctures moderately coarse, deep and close. Elytra three-eighths wider than the prothorax and two and one-half times as long, nearly twice as long as wide, sides straight and parallel to apical two-fifths; serial punctures almost completely concealed except the sutural row, not very coarse, larger in the small denuded spots which occupy the usual positions; alternate interspaces not perceptibly more prominent. Beneath densely pubescent, finely speckled with black points; legs bristling with longer hairs. Length, 8.5 mm.; width, 3 mm.

Type.—From Pasadena, California. Two examples collected by Dr. Fenyes in February.

This is one of the most distinct species in our fauna by its dense white vestiture abundantly bristling with long erect hairs. In *pilosus* and *jacobinus* the elytral setae are long, but the alternate intervals are very strongly costiform in the former, while in the latter the setae are sparser and shorter and the vestiture generally darker, while in both the form is distinctly stouter and more oval.

PHYLLOTROX Sch.

In the Rhynchophora of North America* Dr. LeConte describes two small species which he doubtfully refers to *Phyllotrox*. Whether either of these is a true representative of the

* Proc. Am. Philos. Soc., XV, p. 174.

tropical American *Phyllotrox* is still uncertain, but it may be stated as a fact that the two species described by LeConte—*nubifer* and *ferrugineus*—are at least subgenerically and probably generically distinct, and that his series of *nubifer* involves two very distinct species, one of which is congeneric with the Floridian *ferrugineus*. The true *nubifer* is at once easily separated by its short feebly curved beak, finer elytral striae, which are usually more or less irregularly or confusedly punctured toward the base, the more densely punctate elytral interspaces and usually by the prothorax and elytral suture—especially toward the base, being more or less blackish—whence the name. In the undescribed form mixed with *nubifer* the beak is longer and more arcuate, the elytral striae coarser and regularly punctate throughout, the intervals more sparsely punctulate, the legs less stout, and the upper surface never with darker areas. As indicated above, these characters are shared with *ferrugineus*, and to these two may be added three other apparently distinct forms to be described below.

With *nubifer* belongs the New Mexican *quadricollis* described by the writer,* and for these the genus *Phyllotrox* may be retained pending further information. *Ferrugineus* and allies are less in harmony with the preceding than they are with *Euclyptus* Dietz, to the generic description of which they conform closely and to the type of which—*E. testaceus*†—they are very similar. The genus *Hypoleschus*† recently described by the writer is very near *Euclyptus*, differing chiefly in its sharply toothed claws, long second funicular joint and black color. In the species of the *ferrugineus* series the claws are merely thickened and obtusely angulate at base, while in *nubifer* and *quadricollis* they are quite simple.

The two species of *Phyllotrox* known to me easily separate as follows:

Size larger, prothorax relatively wider, beak a little shorter, antennal club longer than funicular joints 2–7, pygidial groove not attaining the apex (New Mexico).....**quadricollis.**

* Trans. Am. Ent. Soc, XXXIII, 1907, p. 265.

† Trans. Am. Ent. Soc., XVIII, 1891, p. 272.

Size smaller, prothorax narrower, beak a trifle longer, antennal club barely as long as funicular joints 2–7, pygidial groove nearly attaining the apex (California, Arizona, New Mexico, Colorado).....**nubifer.**

EUCLYPTUS Dietz.

The species of *Euclyptus*, except *testaceus*, which I have not sufficiently examined, are separable as below.

Size larger, about 2 mm. in length, elytra more than one-half longer than wide, and almost two and one-half times as long as the prothorax.

Last ventral segment moderately coarsely and closely punctate, nearly or quite as long as the two preceding in the ♀, and longer than the two preceding in the ♂.

Last ventral of ♀ broadly rather strongly tumid posteriorly, that of the ♂ flat and without apical emargination (New Mexico).....**derivatus.**

Last ventral of ♀ nearly flat, becoming feebly broadly impressed at middle apically; last ventral of ♂ minutely emarginate at apex.

Form stouter, elytra not widening appreciably posteriorly (California, Arizona).....**rutilus.**

Form, including legs, more slender, elytra widest at or a little behind the middle (♀ not known) (Colorado).
sejunctus.

Ventral segments finely sparsely punctate, the last three subequal in length in the ♀ (♂ not known) (New Mexico).
equisectus.

Size smaller, 1½ mm. in length, the elytra rather less than one half longer than wide and about two and one-fourth times as long as the prothorax.....**ferrugineus.**

As compared with *ferrugineus*, the size in *testaceus* is evidently larger, the prothorax is relatively a bit wider, the last ventral a little longer, being distinctly longer than the two preceding together; the metasternum apparently more coarsely punctate, not clearly visible in *ferrugineus*.

E. rutilus n. sp.—Elongate oval, rufotestaceous, the metasternum usually brown or piceous, lustre rather dull, pubescence recumbent, not dense, and of a bright golden yellow color. Beak (♂) about as long as the prothorax, regularly moderately strongly arcuate, cylindrical, rather densely punctate, the punctures tending to become confluent longitudinally. Antennae (♂) inserted at apical two-fifths, slightly more basal but evidently beyond the middle in the ♀, in which sex the beak is a little longer and less densely punctured and more

shining toward the apex. Scape nearly attaining the eyes; funicle 7-jointed, basal joint obconic, nearly twice as long as wide, much wider than, and nearly twice as long, as the second, the latter similar in form but shorter, about one-third longer than wide and not quite as long as the next two; joints 3–7 short, gradually increasing in width, the 7th about half as wide as the club, the latter blackish, broadly oval pointed, about as long as the preceding five joints. Prothorax slightly longer than wide, sides broadly arcuate, subparallel basally, narrowed anteriorly and feebly constricted at apex, surface densely moderately coarsely punctate. Elytra three-fifths wider than the prothorax and nearly two and one-half times as long, two-thirds longer than wide, sides feebly arcuate or subparallel basally, discal striae regular, feebly impressed, closely rather coarsely punctured, intervals wider than the striae, nearly flat, subbiseriately punctulate. Beneath more sparsely pubescent and shining, moderately punctate, the last ventral rather coarsely and closely so. Last ventral (♂) longer than the two preceding, flat, apex with a small apical notch; in the ♀ subequal in length to the two preceding, surface broadly flatly impressed at middle apically. Length, 1.9–2.4 mm.; width, .8–1 mm.

California—Santa Barbara, February (type, ♂), Lake Tahoe, July. Huachuca Mountains, Arizona (Wenzel).

According to Dr. Van Dyke occurs on *Ceanothus*. In the Arizona specimens the pubescence is not so distinctly golden as in the typical Californian form.

E. derivatus n. sp.—Very similar to the preceding, but separable by the sexual characters of the last ventral as given in the table. The pubescence is ochreo-cinereous rather than golden in the specimens before me, and there is a marked tendency for the head, including the beak, the prothorax and the greater part of the under surface to become darker or even piceous in color. The second funcular joint is shorter, barely perceptibly longer than wide, the outer joints wider and thinner, almost disk-like, the seventh two-thirds or three-fourths as wide as the club.

Specimens were collected at Cloudcroft, New Mexico (type, ♀), in June by both Viereck and Knaus. Two ♂'s among the Huachuca Mountains specimens sent me by Mr. Wenzel agree with these in the non-emarginate last ventral and antennal characters and doubtless belong here.

E. equisectus n. sp.—Very similar in form and facies to the two preceding species, but with the surface, especially of the prothorax, more shining; color rufotestaceous, metasternum but slightly darker, ventral surface flavotestaceous. Beak (♀) longer than the prothorax,

very evidently less arcuate than in the preceding; antennae inserted at apical two-fifths, funicular joints short, the second very little longer than wide but nearly as long as the two following; seventh about two-thirds as wide as the club. Prothorax a little narrower and less closely punctate than in *rutilus* and *derivatus;* elytral striae rather finer, the intervals a little wider. Ventral surface sparsely very finely punctate, the last three segments of nearly equal length; terminal segment broadly feebly impressed at middle apically, the two preceding segments each with a narrower basal impression. Length, 2.4 mm.; width barely 1 mm.

Type.—♀; from Cloudcroft, New Mexico (Knaus).

E. sejunctus n. sp.—Rufotestaceous; head, beak, elytral suture and side margin (narrowly) brownish-piceous, body beneath nearly black. Above rather thinly ochreo-cinereous pubescent, surface quite strongly shining. Beak (♂) just perceptibly longer than the prothorax, moderately and evenly arcuate, densely strigose punctate and dull. Antennae inserted at apical two-fifths of beak, first funicular joint about twice as long as wide and longer than the next two, second similarly proportioned but much smaller, as long as the next two united; following joints evidently transverse, the seventh not much more than half as wide as the club, the latter scarcely as long as the four preceding joints. Prothorax a little longer than wide, sides broadly arcuate, surface moderately strongly and closely punctate, the punctures well separated, however, the intervals shining. Elytra three-fifths longer than wide and about four-fifths wider than the prothorax, sides feebly arcuate and a little divergent from base to middle; striae fine, intervals wide and very finely remotely punctulate. Body beneath more strongly but not very closely punctate; last ventral as long as the two preceding segments and with a very small and shallow apical emargination. Legs entirely pale and rather slender. Length, 2.1 mm.; width, .8 mm.

Type.—From Colorado. A single ♂ given me by Mr. Blanchard.

The position of this species in the table is somewhat tentative, the ♀ being unknown; it is, however, readily separated from *rutilus* and *derivatus* by its less robust form and less closely punctured and more shining surface. It is more like *equisectus* in these respects, but differs in the longer basal funicular joints, and somewhat in form as well as color.

E. ferrugineus Lec.

The description of this species, which is fairly characteristic, is based on a unique female from Florida. It is smaller

than any of the western forms—length 1.5 mm.—the beak is very slender, evenly rather strongly curved, finely punctate and apparently not at all strigose; eyes a little more prominent than in the Californian species; last ventral nearly flat and as long as the two preceding. The prothorax is barely as long as wide, elytra two and one-fourth times as long as the prothorax, and rather less than one-half longer than wide. I have seen no other specimen.

ANTHONOMUS Germ.

The following notes on the species of this and allied genera are to a considerable extent the result of a recent examination of some of the types in the LeConte, and also in the W. G. Dietz Collection, now in the Museum of Comparative Zoölogy at Cambridge, Mass.

A. pusillus Lec.

In Dietz's Revison this species is recorded solely from Massachusetts. The unique type, as stated in the original description, was from Texas (collected by Belfrage), but by some accident has disappeared from the point and is doubtless lost, as I looked carefully for it in the bottom of the box without success. There are, however, two Columbus, Texas, examples of *pusillus* in the general mixture of unplaced specimens at the end of the box, and these no doubt are precisely like the lost type. The greater number of specimens of this species now in collections are probably from Massachusetts, where it has been taken in numbers near Lowell on *Helianthemum canadense* by Mr. Frederick Blanchard, who speaks of it at some length in Entomologica Americana, Vol. III, p. 87.

A. hamiltoni Dietz.

So far as I can see, this differs from *pusillus* only in having the scales a little yellower, and the subdenuded area of the elytra better defined. I should have little hesitancy in uniting them.

A. vulpinus Dietz.

I see no possible means of separating this from *profundus* Lec. There are perfect intermediates in size and color in

the LeConte series, and there is, I think, sufficient individual variability in the lengths of the funicular joints to cover the differences given by Dietz, which do not look as important in the specimens themselves as they appear on paper.

A. rubidus Lec.

The accessory cusp on the front thighs of which Dietz speaks in his table, is faintly indicated in the type, and is rather more pronounced in some examples of *profundus*, in which both LeConte and Dietz say it is absent. The two species are, of course, quite distinct, but the accessory cusp is not to be relied upon as a distinguishing character.

A. haematopus Boh.

Both LeConte and Dietz have expressed themselves as pretty well satisfied that this is the same as *sycophanta* Walsh., and I am myself convinced of it. *Bolteri* Dietz and *confusus* Dietz are exceedingly close to and, perhaps, only varieties of the above; but of this I do not yet feel assured.

A. brunnipennis Mann.

There is no very good reason for believing that the single example so identified by LeConte is the true *brunnipennis*. Mannerheim's description is very brief, but calls for an insect two lines long excluding the rostrum, finely pubescent, pitchy black with brown elytra. LeConte's specimen is a ♀, considerably smaller, uniform in color, and rather sparsely but truly squamose.

Specimens taken by Mr. H. S. Barber at Blair's Ranch, Humboldt County, California, are apparently identical with the LeConte specimen, which was taken by Crotch at Geysers, California. This species should be placed near *murinus* of the *squamosus* group, differing from the latter by its more coarsely punctured thorax, more unevenly disposed vestiture which is condensed on the median line and at the sides of the prothorax, and more or less at the middle of the fourth and toward the base of the sixth elytral intervals.

I have seen a number of examples of the Californian *morulus* with brown elytra, and here the vestiture would fit Mannerheim's expression "tenuiter pubescens," but the prothorax is not conspicuously "profunde rugoso-punctate,"

the tibiae and tarsi are not ferruginous, at least in mature specimens, and the size is much too small. I have as yet seen nothing that fairly fits Mannerheim's description, and should be glad to hear from any collector who believes he has a good *brunnipennis*.

A. melancholicus Dietz.

I have scarcely a particle of hesitation in pronouncing this and *murinus* of the *squamosus* group identical. *Melancholicus* is truly a squamose species and should be transferred to the *squamosus* group, replacing there the name *murinus* which becomes a synonym. I am unable to detect an appreciable tooth on the middle thighs in *melancholicus*, in fact, in this and all other respects they appear to agree, comparison being made between the two types, which are both ♀'s. There is a second example of *melancholicus*—a ♂, and with the ♀ type of *murinus* are two other examples which are probably not identical, one from Texas, the other from California (not Colorado).

A. sulcifrons Lec.

This cannot be separated from *musculus* Say. It is not black as LeConte describes, but pitchy brown, the elytra at least very plainly so. I do not consider the form of the frontal fovea to be of much significance. It varies much in depth and distinctness and tends to become elongate in some individuals when normally more or less punctiform. The narrow impressed line in the type of *sulcifrons* is probably accidental, as none of the other three placed in the series by Dietz have it—these at least would all make good *musculus*.

A. sexguttata Dietz.

Dietz says the front is sulcate in this species ; I found the fovea approximately punctiform in all the specimens of his series that I examined.

A. albopilosus Dietz.

I cannot remember whether any one has called attention to the small tooth on the inner edge near the apex of the hind tibiae in the ♂ of this species. The character is a unique one.

A. solani nov. sp.

Very closely related to the *aeneolus* of Dietz with which it was confused by that author. The type of *aeneolus* is from Columbus, Texas. The Los Angeles and Arizona examples included by Dietz belong to the present species. This differs most obviously from *aeneolus* in its somewhat broader form, and in having the prothorax narrowed from the base or very close to it, while in *aeneolus* the sides are rounded in at base, the point of maximum width being at or near the basal third. The tarsi and the tibiae in outer half are rather conspicuously paler in *aeneolus*, only slightly so as a rule in *solani*. Dietz describes the antennae as inserted at about one-half from the apex. This is substantially accurate for the ♀'s, but in the ♂'s of both species, the point of insertion is about two-fifths from the apex of the beak.

Solani has occurred in some numbers on *Solanum nigrum* near Pomona, California (type ♂), in October and November. One specimen bears date "Apr. 23."

This species was originally identified for me as *aeneolus*, and is the one so recorded in my So. California List.

A. obtrusus n. sp.—Uniformly piceous brown, moderately shining, clothed above conspicuously but not densely with pale ochreous squamiform hairs, which are condensed on the scutellum, somewhat on the median line of the prothorax, and in two posterior transverse elytral fasciae which nearly reach the suture and enclose a less pubescent area. Body beneath with similar squamiform hairs except on the ventral segments, which are finely pubescent. Antennae testaceous, club piceous; second funicular joint rather less than twice as long as wide, and about two-thirds longer than the following joint, which is very nearly as wide as long. Head sparsely punctulate. Beak a little longer than the head and prothorax, shining and punctate at apex, finely strigose and opaque with feeble lateral sulci behind the antennal insertion, which is at the apical two-fifths; median line finely carinate; front finely and feebly sulcate; eyes separated by one-half the width of the beak. Prothorax one-half wider than long, sides distinctly arcuate, widest at about the middle, hind angles obtuse, apical constriction not strong, punctuation close and moderately coarse. Elytra one-fourth longer than wide, sides subparallel for three-fifths their length, striae finely impressed, moderately punctate; intervals feebly convex, not evidently punctate. All the femora armed with an acute tooth

which is quite small on the posterior pair; claws with a moderately long tooth, tibiae straight. Length 2 mm.

Type.—From Brownsville, Texas.

Described from a single ♂ example which seems to be most closely allied to *sulcifrons*, but distinguishable by the coarser and denser vestiture, longer beak, paler antennae, and finer and less coarsely punctate striae.

Since writing the above I have examined the LeConte and Dietz Collections, and have come to the conclusion, already expressed in a note on *sulcifrons*, that this latter is not separable from *musculus*, which name may therefore be substituted for *sulcifrons* in the above paragraph.

The species which I have here described seems to be identical with two Texan specimens included by Dietz with his *vespertinus*, the type of which comes from Jacksonville, Fla. In this type the frontal fovea is not obviously elongate (Dietz says sulcate in his description but foveate in his table), the vestiture is nearly white, surface lustre dull, not very coarsely pubescent above except in condensed areas, where the hairs are squamiform, but beneath they are more properly scales, and are very dense on the under side of the head and sides of the body. Above they are denser on the median line of the prothorax and in two transverse elytral fasciae, the anterior consisting of three spots occupying intervals 4–6–8, the posterior less distinctly defined but seemingly similarly formed. The insect is in good condition but apparently somewhat immature.

In the two Texan examples which follow the type of *vespertinus* the vestiture of the upper surface is ochreous, more uniformly squamiform, the fasciae not evidently broken into spots; vestiture beneath very much the same in character as above and not conspicuously more scale like, elytra distinctly shining. Both specimens are ♀'s, with the antennae inserted slightly beyond the middle of the beak.

A. basidens n. sp.—Robust, oval, deep black; antennae testaceous at base, becoming gradually darker externally, the club piceous. Above subglabrous, the pubescence excessively short, fine and sparse, except for the scutellum and a small area of equal size posteriorly con-

tiguous to it on each sutural interspace which is densely clothed with white squamules; beneath normally sparsely pubescent, the hairs fine on the abdomen, coarser on the sterna. Head alutaceous, opaque, finely sparsely punctate; frontal fovea punctiform, eyes separated by scarcely half of the width of the beak, the latter as long as the front femora, coarsely striate almost throughout, the striae punctate; antennae inserted at the apical two-fifths (♂) or just beyond the middle (♀); second funicular joint not quite twice as long as wide, nearly as long as the next two; third about as long as wide. Prothorax distinctly transverse, sides arcuate and very little convergent in basal two-thirds, thence more strongly convergent and sinuate to apex; hind angles a little obtuse; punctuation close, moderately coarse, the intervals alutaceous and dull. Elytra short, not more than one-fourth longer than wide, three-fifths wider than the prothorax, sides nearly straight in basal half, striae rather coarse, well impressed and rather strongly punctate; intervals convex, very minutely transversely rugulose, feebly shining, the hairs excessively short and fine; basal margin with a transverse dentiform prominence at the base of the third interspace. All the femora acutely toothed, the tooth of the anterior femur larger as usual, acutely triangular and longer than wide; tibiae straight; ungual teeth moderate, approximate at tip. Length 1.7–2 mm.

Type.—♂; from Santa Rosa, Lower California (Beyer).

This species will fall near *ebeninus* in Dietz's table, but is abundantly distinct from any other species known to me. The peculiar basal dentiform prominences of the elytra are characteristic and I think unique, at least so far as our fauna is concerned.

A. obesulus n. sp.—Very robust, black, above rather thinly clothed with elongate yellowish-gray scales which are more or less condensed and whiter in a median and sublateral vittae on the prothorax, scutellum densely clothed with white scales, also a short line of similar scales on the fourth just behind the middle and at the base of the sixth elytral interspaces; beneath more densely albo-squamose, especially at the sides of the sterna, the vestiture of the ventral segments sparser and more hair like. Head numerously punctate, frontal fovea fine, linear; eyes separated by slightly less than the width of the beak. Beak rather slender, feebly curved, nearly half as long as the body, finely punctate, the punctures more or less confluent longitudinally, but without well defined striae; lustre dull in basal half, more shining apically. Antennae inserted near the middle of the beak, rufotestaceous basally, outer joints gradually darker, club dusky, slender, funicle 7-jointed, second joint nearly twice as long as wide and subequal to

the next two, which are mutually equal and fully as long as wide. Prothorax strongly transverse, sides moderately convergent from the base and nearly straight for two-fifths their length, then rapidly arcuately narrowed to the apical constriction; punctuation dense and moderately coarse, the punctures in mutual contact or very nearly so. Elytra three-fifths wider than the prothorax, one-sixth longer then wide, sides parallel in basal half, striae rather finely impressed, moderately punctate; intervals nearly flat, about three times as wide as the striae, sparsely punctulate and moderately shining. Second ventral segment distinctly longer than the third, the latter just visibly longer than the fourth, fifth as long as the third. Legs black, tarsi becoming piceous brown; all the femora apparently unarmed. Length, 2.3 mm.; width, 1.4 mm.

Type.—From Ormsby County, Nevada (Baker).

The type is a ♀, and with it I place a ♂ from the same locality which is almost surely identical; it is a little less robust, the vestiture a trifle sparser, the pronotal vittae obsolete, and the short elytral vittae while evident, are much less conspicuous; the front thighs have a barely visible obtuse tooth, the hind tibiae are slightly incurved at apex, but scarcely enough to throw the species into the subgenus *Cnemoscyllus*. If it were so referred, however, it is at once distinguishable from any of the species with 7-jointed funicle by its stouter form and sparser vestiture. The species seems best referred to the *squamosus* group, from all of which it differs by its stouter form. The vestiture is sparser than in any of the species with nearly unarmed femora; *murinus* approaches it in this respect, but in this latter the scales are unicolorous.

A. appositus n. sp.—Rufopiceous; legs, beak and antennae rufous; body densely clothed with pale ochreous to brown, and whitish scales, the latter forming three conspicuous vittae on the prothorax, covering the scutellum, the fourth and sixth elytral intervals for the greater part of their length, intervals 8–10 in great part; there are also numerous white scales on the sutural interval, and those of the undersurface are mostly of this color. Beak (♂) longer than the head and prothorax, rather densely punctate and striate throughout; dull and squamose basally, more shining apically. Eyes separated by a little less than the width of the beak. Antennae inserted at about the apical two-fifths of the beak in the ♂, a little beyond the middle in the ♀; funicle 7-jointed, second joint twice as long as wide, nearly twice as long as the third and subequal to the third and fourth united. Prothorax a little wider than long, sides moderately arcuate and strongly

convergent from the base, apical constriction feeble, surface densely punctate; scales ovate, acutely pointed behind, subcontiguous but not entirely concealing the punctures. Elytra about one-third wider than the prothorax, humeral angles moderate, sides parallel in basal half, striae and punctures moderate, intervals nearly flat, minutely rugulose, scarcely shining. Ventral surface moderately densely scaly, the scales narrower than at the sides of the sterna, becoming hair-like at the middle of the fourth segment, the fifth truly pubescent. All the thighs armed with a small acute subspiniform tooth, less obvious but quite distinct on the posterior pair. Length, 3–3.2 mm.; width, 1.4–1.6 mm.

Type.—♂. Huachuca Mountains, Arizona (♂ ♀); Havre, Montana, one ♂ collected by Professor Wickham is apparently identical.

Closely related to *tectus*, but differing in its longer second funicular joint and denser vestiture. It is still nearer to *heterothecae* Pierce, but is much larger and more conspicuously vittate than a specimen of the latter kindly sent me by Mr. Pierce. This specimen is 2.2 mm. in length, and this is the length given by Mr. Pierce in his description. In *tectus* the second funicular joint is normally short, very distinctly less than twice as long as wide and much shorter than the two following united.

A. tectus Lec.

Dietz records as the habitat of this species—Arizona, New Mexico, Colorado and Utah. He has certainly confused two or more species under this name, none of which perhaps are the real *tectus*, the unique type of which is from Massachusetts. In the original description Massachusetts and Georgia are given as localities, but the representative from the latter region is not now in the LeConte cabinet; possibly it may be in the Horn Collection. The western limits of this species are as yet undetermined. Specimens from Belvidere, Kansas, sent me by Mr. Knaus are very close indeed to typical *tectus* and I so place them, but the probability is great that specimens from the Rocky Mountains and further west are not identical with the New England type. *Tectus* has been taken in numbers in recent years at Tyngsboro, Mass., by Mr. Blanchard, who found it on wild asters (Diplopoppus) in September.

A. molochinus Dietz.

Specimens in no way distinguishable from the Montana type have been taken at Franconia, New Hampshire, in September or October by Mrs. Slosson, who writes that they were swept from wild asters in a limited area.

A. mimicanus n. sp.—Moderately elongate, piceous; legs, beak and antennae—except the club—rufotestaceous; body very densely clothed with broad overlapping grayish-white scales which completely conceal the sculpture. Beak (♂) as long as the head and prothorax, moderately arcuate, not densely punctate, the punctures arranged serially toward the base; antennae inserted at apical two-fifths, funicle 6-jointed, second joint about twice as long as wide, one-half longer than the third and subequal to the second and third united. Eyes separated by slightly less than the basal width of the beak. Prothorax a little wider than long, sides parallel and broadly rounded in basal two-thirds, apical constriction feeble. Elytra obviously but not greatly wider than the prothorax, elongate oblong, sides parallel to behind the middle. Fifth ventral segment about one-half longer than the fourth, the latter equal to the third. Front thighs minutely toothed; hind tibiae straight; claws small with a short acute basal tooth. Length, 1.7–2.2 mm.; width, .7–.9 mm.

Type.—♂; from Tuscon, Arizona (Wickham).

Very similar to *canus* but a little stouter, the hind tibiae not curved in the ♂, the last ventral less elongate and the claw tooth slightly shorter. Because of the unmodified hind tibiae of the ♂, *mimicanus* must be referred to the *squamosus* group in which it is to be associated with *pauperculus* by Dietz's table.

A. latiusculus Dietz.

I cannot for a moment accept this as distinct from *subfasciatus* Lec. The distinctive characters given by Dietz are no more than individual. As illustrating the failure of the tabular characters, a North Carolina specimen in my collection would by the elytral fascia be *latiusculus*, but by the frontal fovea would be *subfasciatus*.

A. moleculus Csy.

I can see no means of separating this from *robustulus* Lec. According to Casey *moleculus* differs in its "narrower form and slightly different vestiture;" according to Dietz *mole-*

culus is "closely allied to *robustulus* with which it agrees in form and vestiture." In LeConte's description of *robustulus* the thighs are said to be not toothed, and the second and third funicular joints equal or nearly so. Casey describes *moleculus* as having the front thighs toothed and the second funicular joint longer than the third. The front thighs are really toothed in *robustulus*—LeConte was in error here—while the second funicular joint is, or is not, appreciably longer than the third according to the individual specimen one is examining. As Casey described from an unique he could not know this, but it is equally true in a series of both eastern and western specimens, and here as well as in many other species the variation is in some degree sexual.

The characters given by Dietz for separating *moleculus* from *robustulus* are in part individual and in part non-existant; e. g. he says that the second and third funicular joints are together longer than the next three in *robustulus*, which is not true.

A. sphaeralciae n. sp.—Elongate oblong, piceous, beak, antenae and legs bright rufous, vestiture exceedingly dense both above and below, consisting of pale ochreo-cinereous scales which are on the average about twice as long as wide, almost perfectly uniform in color above except along the median line and at the sides of the prothorax, where they are whitish. The scutellum is densely white, and there are barely perceptible traces of short paler vittae on the sutural, fourth, and sixth elytral intervals, Body beneath very densely clothed throughout with whitish scales, wider at the sides of the sterna, and narrower but not hair-like on the ventral segments. Antennal funicle 7-jointed, second joint nearly twice as long as wide and not much shorter than the two following joints united. Eyes and beak nearly as in *appositus*. Prothorax very nearly as long as wide, subconical, apical constriction feeble. Front femora with a small acute tooth, middle and hind femora apparently unarmed. Hind tibiae (♂) straight, with a rather feeble parallel sided dilatation in apical fourth. Length, 3 mm.; width, 1.3 mm.

The type is a ♂ from Phoenix, Arizona, taken on *Sphaeralcea variabilis* by Prof. Cockerell. With the type I associate single specimens from Santa Rita Mountains, Arizona; Pike's Peak and Boulder, Colorado; Wallace, Kansas; and Dakota.

These all agree in bodily form, and the ♂'s (Pike's Peak and Wallace, Kansas), agree in the form of the hind tibiae. In none of these is the vestiture quite so dense as in the type, and there is some small variation in the relative lengths of the second and third funicular joints, the second being distinctly shorter and not much longer than the third in the Dakota example. Some of the other specimens are, however, intermediate in this respect, and its value therefore seems doubtful. *Sphaeralciae* should be referred to the subgenus *Cnemocyllus* because of the modified ♂ hind tibiae, which, in fact, are precisely of the same type as in *helianthi*. This latter is a stouter species, with whiter vestiture, which is more hair-like toward the abdominal apex, and with more elongate second and third funicular joints. I have recently seen specimens of *sphaeralciae* placed with *hirtus* in the Dietz Collection. In this latter species the scales are narrow and linear, in fact LeConte in his description speaks of the vestiture as "coarse scarcely squamiform pubescence."

A. cycliferus n. sp.—Narrowly oval, piceous, legs and antennae rufous, club fuscous; clothed very densely throughout with overlapping broadly oval or nearly circular white scales, intermixed with scattered darker scales varying from pale brown to blackish purple in color, these darker scales aggregated most noticeably in two imperfect discal pronotal vittae and in an elongate discal elytral spot at about the posterior third, and less evidently in a subbasal spot on either side of the suture. Beak about one-fourth longer than the prothorax, polished and rather finely sparsely punctate, subsulcate at sides basally, base squamose for a short distance. Antennae inserted at about two-fifths from the apex in the ♂, just perceptibly beyond the middle in the ♀; second funicular joint as long as the next two (♂), distinctly less so (♀), the third and fourth joints each a little longer than wide, the third slightly longer than the fourth. Prothorax three-fourths as long as wide, sides broadly arcuate and subparallel in basal half, moderately convergent and evidently though not strongly constricted apically; surface completely concealed by the vestiture. Elytra at base very little wider than the thorax, gradually feebly wider posteriorly, widest at about the middle; striae invisible. Front thighs with a small acute tooth, middle and hind thighs not visibly toothed. Front and middle tibiae slightly incurved at apex in both sexes; hind tibiae regularly and more strongly curved in the ♂, nearly straight in the ♀. Ungual teeth short and not approximate at their tips. Length, 2.3–2.6 mm.; width, .85–1 mm.

The type is a ♂ from St. George, Utah, collected by Prof. Wickham. With it I have placed several ♀'s from Milford, Utah, also collected by Wickham, which are doubtless identical although they differ constantly in the relatively shorter second funicular joint. A ♀ specimen labelled Santa Cruz, California, is perfectly similar to the Utah ones except in its larger area of dark scales, and is placed with them; there is possibly an error in locality.

This species is a *Cnemocyllus* and may best follow *canus*, from which it differs by its narrower form and intermixture of dark scales.

A. tenuis n. sp.—Also a *Cnemocyllus*. Very similar in form and vestiture to the preceding species, the differences of moment being as follows: The size in series is distinctly smaller, the general form even narrower, vestiture white throughout, and in some examples at least, a little less dense; all of the femora apparently unarmed; hind tibiae of ♂ less strongly curved; claws with longer teeth which are approximate at tip. Length, 1.6–1.9 mm.; width, .65–.75 mm.

Type.—A ♂ from Ormsby County, Western Nevada (Baker).

Other localities represented are Goldfield, Nevada (Nunenmacher); Chad's Ranch, Utah (Wickham); Pocatello, Idaho (Wickham); Bridgeport, California (Wickham); Santa Cruz, California, this last locality open to doubt.

This is one of the species that passes as *nanus* (=*canus*) in collections. The true *nanus* is not so narrow. It was described from Texas, and probably does not occur at all in the region occupied by the present species.

A. juncturus n. sp.—Moderately elongate, parallel, brownish, clothed above with subcontiguous broadly oval to narrowly oval feebly contracting dull ochreous and pale brown scales, which are larger, paler and somewhat denser in three thoracic vittae, alternating with two broader stripes of narrower brownish scales. Elytra uniformly clothed with pale ochreous scales which are barely visibly denser at the middle of the fourth and toward the base of the sixth interspaces; beneath, sterna quite densely clothed with broad scales, the ventral segments with sparser narrower scales. Beak about one-fourth longer than the prothorax, moderately coarsely punctate striate, median line narrowly smooth and feebly cariniform behind the antennal insertion. Head squamose; eyes separated by a little less than the basal width

of the beak. Antennae inserted at about the apical two-fifths of the beak; funicle 6-jointed, second joint a little longer than the third, this slightly longer than the fourth. Prothorax moderately transverse, the sides broadly arcuate and convergent anteriorly, apical constriction broad and feeble, punctuation strong and dense. Elytra four-fifths longer than wide, one-fifth wider than the prothorax, sides straight and parallel for more than half their length, apex rather narrowly parabolically rounded; striae moderate, rather coarsely punctate basally, the intervals slightly convex. Femora unarmed; hind tibiae sinuate interiorly but not visibly bent; claws armed with very short but finely acuminate basal teeth which are not approximate at tips. Length, 2.15 mm.; width, .8 mm.

Type.—From Ensenada, Lower California. A single ♂ specimen.

The derm throughout is brownish in color and may possibly indicate immaturity. The last ventral segment is but little shorter than the two preceding united. Although the hind tibiae are not visibly bent, the general aspect is that of *Cnemocyllus* and its place is apparently near *ligatus*, which Dietz placed in this subgenus for like reasons.

According to Dietz the claws in *legatus* are armed with a short obtuse tooth, and the elytra show a dark "denuded fascia" extending from the sides to the fourth interspace; the elytra are also both by description and in the figure more nearly equal to the prothorax in width than in the present species. In an El Paso, Texas, specimen which I have confidently determined as *ligatus*, after comparison with the Deitz Collection, the vestiture is very dense, the scales more or less overlapping throughout.

A. canus Lec., **A. affinis** Lec., **A. nanus** Lec.

After repeated and careful examination of the types of these three supposed species I am pretty well convinced that they constitute but a single species. They are all from the same source and very probably from the same locality, and there appear to be absolutely no differences except size and relative length of the second funicular joint. The LeConte Collection contains the following representatives.

Canus.—One ♂, 2.3 mm. long excluding beak, hind tibiae rather feebly nearly evenly curved, second funicular joint as

long as the next two, last ventral not much shorter than the two preceding united. LeConte's original description calls for four specimens, but the collection now contains only the unique type here briefly characterized.

Affinis.—Type ♀, 1.95 mm. long, hind tibiae straight, second funicular joint a little longer than wide and a little longer than the third, but evidently shorter than the next two; last ventral distinctly shorter than the two preceding.

Second example—a ♂—2 mm. long, agreeing with *canus* except that the second funicular joint is shorter, about one-half longer than wide, and relatively longer than in the first example though shorter than in *canus*.

Third example—♀, 2.1 mm. long, second funicular joint twice as long as wide and four-fifths as long as the two following.

Nanus—Type, ♀, 1.6 mm. long, virtually identical in antennal formation with type of *affinis*.

The types of *canus* and *affinis* have the scaly covering pretty well preserved and seem to be uniformly white; all other examples are much abraded, but the scales are large and white in all specimens.

The *nanus* of the Dietz Revision and of most collections is not the true *nanus* of LeConte, but either the *A. tenuis* or the *Epimechus gracilis* of the present paper.

Neomastix punctulatus Dietz.

Dietz expresses a doubt of the distinctness of this from *solidaginis*. I believe his suspicions are well grounded and should call them identical.

EPIMECHUS Dietz.

E. gracilis n. sp.—Form very narrow and elongate, black, antennae —except the club,—legs and sometimes the beak rufous or rufotestaceous; vestiture dense, white throughout, consisting of large broadly oval or rounded more or less overlapping scales. Beak (♂) but slightly longer than the prothorax, shining, squamose at base, finely not densely punctate, substriate laterally. Antennae inserted at the middle of the beak in the ♂, funicle 6-jointed, second joint a little longer than the third but evidently shorter than the next two together. Prothorax evidently wider than long, widest at or a little behind the middle with the sides moderately arcuate, or with the sides subparallel and very feebly arcu-

ate in basal half; apical constriction broad; surface densely rather coarsely punctate, moderately shining when denuded. Elytra very slightly wider at base than the prothorax, twice as long as wide and three times as long as the prothorax; sides subparallel and feebly arcuate in basal two-thirds; striae moderately strongly punctured. Femora unarmed; hind tibiae not appreciably curved in the ♂; claws simple. Length, 1.5–1.75 mm.; width, .6–.65 mm.

Albuquerque, New Mexico (type ♂); Las Vegas, New Mexico; Williams and Walnut, Arizona; the latter from Prof. Wickham.

In the ♀ the beak is considerably longer and more slender, the antennae inserted scarcely perceptibly behind the middle. The last ventral is about one-half longer than the preceding in the ♂, scarcely longer than the preceding in the ♀, in which it bears a median rounded impression.

This species is strikingly similar to *A. tenuis* described above, and with it is often held in collections as *nanus*, which name, indeed, it has borne in my collection for many years. The simple claws of course will at once separate it from both *tenuis* and *nanus*. In *tenuis* the antennae are inserted distinctly beyond the middle of the beak in the ♂. *E. nanulus* is a close relative of the present species and from the same type locality. It differs in its sparser vestiture, the scales less broadly rounded, the relatively greater width of the elytra as compared with the prothorax, and the black or piceous legs and antennae.

E. canoides n. sp.—Very like the preceding but larger, elytra at base nearly one-third wider than the prothorax, abdomen clothed medially with sparser narrower scales, the latter becoming hair-like on the last segment, which in the ♂ is nearly as long as the two preceding. Front thighs with a small spiniform tooth; hind tibiae distinctly though not very strongly curved in the ♂. Length, 2–2.15 mm.; width, .8–.85 mm.

Type.—♂; from El Paso, Texas; two ♂'s, two ♀'s.

E. modicus n. sp.—Piceous, legs and beak rufotestaceous, antennae pale at base, gradually infuscate outwardly; vestiture whitish throughout, consisting of moderately broadly oval lanceolate scales on the prothorax, oblong and truncate on the elytra, moderately dense but not often overlapping except more or less so in three thoracic vittae and in the condensed lines occupying the greater part of the

fourth and the basal half of the sixth elytral intervals; scales broad beneath on the sterna, sparse, narrow and hair-like on the abdomen. Beak about one-half longer than the prothorax, rather finely but closely subrugose punctate and dull almost throughout, the tip feebly shining. Head with non-contiguous elongate scales, frontal fovea indistinct, eyes separated by a little less than the basal width of the beak. Antennal funicle 7-jointed, first joint nearly as long as the next three, second less than twice as long as wide and not much longer than the third; club fully as long as the five preceding joints. Prothorax moderately transverse, sides gradually not strongly convergent from the base, apical constriction very broad and feeble; punctuation moderately coarse and close. Elytra about one-fourth wider than the prothorax, humeral angles narrowly rounded, sides parallel in basal half, striae feebly impressed, moderately punctate, intervals nearly flat. Front thighs with a small acute tooth, middle and hind thighs not evidently toothed; front tibiae incurved at apex, middle and hind tibiae nearly straight. Last ventral segment but slightly longer than the preceding. Length, 2 mm.; width, .9 mm.

Type.—From Santa Rita Mountains, Arizona.

This species must be near *curvipes*, but the latter according to description has an ill-defined subdenuded patch at sides of elytra posteriorly, and the middle thighs obviously toothed. The hind tibiae are also said to be curved in both sexes of *curvipes*, but this seems very unlikly, and I strongly suspect that Dietz's specimens are all ♂'s.

Since writing the above I have seen the Dietz Collection and find there two examples of *curvipes*. The first, bearing the label and best fitting his description, and hence to be regarded as the type, is from Nevada. The subdenuded area called for by the description is scarcely evident, and I could not make out the tooth of the middle thighs; if present it must be very small. There is no reliable indication of sex in this specimen except the rather strongly curved hind tibiae, which in all other instances known is characteristic of the ♂; nevertheless I believe this specimen to be Dietz's supposed ♀. The second example is an undoubted ♂ from New Mexico. It is more densely scaly, the antennae inserted distinctly beyond the middle of the beak, form a little narrower, sides of prothorax more incurved at base, hind tibiae barely as strongly curved. In the Nevada type the antennal insertion is less apical, being at about the middle of the beak,

haps is why it was called a ♀ by Dietz. I feel t that both of Dietz's specimens are ♂'s, and resent distinct species. The exact relation of *modicus* to *curvipes* cannot be stated until both sexes of each form are known; for the present *modicus* may be separated by its somewhat denser vestiture, especially on the fourth and sixth elytral intervals, the lack of any trace of a lateral subdenuded area, and the pale legs. It is not unlikely that Dietz's New Mexico ♂ is identical with my *Epimechus nanulus* described from the ♀ and also from New Mexico. The very small size of *nanulus* make this a little doubtful, however, and here again we must wait till both sexes are taken together.

E. mobilis n. sp.—Form rather short oblong oval, piceous, legs reddish, body densely clothed above with broadly oval or rounded largely overlapping scales, ashy-gray varied more or less with pale brown to fuscous. The darker scales form two more or less obvious pronotal vittae alternating with pale. The elytra may be almost entirely cinereous, the darker scales few, or so pale as to be inconspicuous, or the latter may predominate, leaving the suture, a median vittae on the fourth interspace and the basal part of the sixth interspace pale. The antennal funicle is 6-jointed, the second joint a little longer than the third but scarcely as long as the two following, barely twice as long as wide in the ♂, but fully so in the ♀. Antennae inserted near the middle of the beak in the ♂, slightly behind the middle in the ♀, the beak rather strongly curved, subcarinate in basal half. Prothorax one-fourth wider than long, sides moderately arcuate and convergent, apical constriction rather feeble, sculpture concealed by the vestiture. Elytra one-third longer than wide, sides parallel and nearly straight in basal three-fifths. Body beneath squamose, the scales of the ventral segments narrower and less dense. Fifth ventral segment a little longer than the fourth in the ♂, scarcely so in the ♀. Legs rather stout, femora apparently completely unarmed: hind tarsi straight in both sexes. Length 2–2.25 mm.

Southern California—Pomona (type ♂), Claremont, Azusa, San Diego.

This species was first taken by me some twenty years ago and was at that time identified for me by Ulke or Horn as *nevadicus*, under which name I sent it out to numerous correspondents. A comparison which I have just made with the type of *nevadicus* shows it to be quite distinct, however,

by its notably stouter form. The lobes of the third tarsal joint are not as narrow as in *nevadicus*, and there is no appreciable tooth on the front thighs.

The following table though not quite as satisfactory in every respect as I could wish, will help to identify the species of *Epimechus* thus far described.

TABLE OF *Epimechus*.

Antennal funicle 7-jointed.
  Pubescent species, femora unarmed.....**mimicus.**
  Squamose species.
    Vestiture not very dense, white.
      Prothorax trivittate or non-vittate.
        Size small, 1.5 mm., legs and antennae black or very nearly so. **nanulus.**
        Size larger, 2 mm.
          Elytra with ill-defined lateral subdenuded patch, scales scarcely condensed on the fourth and sixth intervals, legs black.....**curvipes.**
          Elytra without trace of lateral subdenuded area, scales distinctly condensed on fourth and sixth intervals, legs pale. **modicus.**
      Prothorax univittate..... .....**soriculus.**
    Vestiture dense, white and yellowish-brown.....**aemulus.**
Antennal funicle 6-jointed.
  Vestiture not very dense.
    Scales shorter and broader, intermixed with short pubescence, front with a long linear impression between the eyes. **adspersus.**
    Scales longer and larger without evident pubescence, front not sulcate .....**stragulus.**
  Vestiture dense.
    Hind tibiae straight in the ♂.
      Scales yellowish-gray, more or less mixed with pale brown or purplish-brown.
        Form rather stout, lobes of third tarsal joint normal. **mobilis.**
        Form distinctly more elongate, lobes of third tarsal joint unusually narrow ....**nevadicus.**
      Scales uniformly white, body narrow elongate.....**gracilis.**
    Hind tibiae curved in ♂.
      Scales white throughout, dense and generally overlapping. **canoides.**
      Scales dull yellow, nearly uniform in color, close set, but not as a rule overlapping .....**arenicolor.**

Alycodes dubius Dietz.
Elleschus angustatus Dietz.

As suspected by Casey, both these species belong to the genus *Dorytomus*. The former is very like and probably identical with *brevicollis* Lec., the latter is close to *squamosus* Lec., and quite likely no more than a slight variety of that species. It seems to be a bit narrower than the type of *squamosus*, the elytral scales more uniform in width, the tessellation more feebly marked.

Orchestes armatulus Dietz.

An examination of the type shows it to be a specimen of *Psomus politus* Csy., in which the elytra are transversely fractured each side behind the humeri—presumably by being grasped too tightly with forceps—the posterior edge of the fracture being more prominent and simulating an anteriorly projecting spine when viewed from above. The error is a remarkable and scarcely excusable one, since one would expect the most careful verification of appearances by the describer before announcing so singular and unexpected a character. The true state of affairs is not very difficult to make out on close inspection, and such inspection should have revealed the very approximate eyes, pectoral channel and other features quite impossible in an *Orchestes*.

ORCHESTES Ill.

O. illinoisensis n. sp.—Black, lustre dull; pubescence whitish, rather long and conspicuous, recumbent, dense on the scutellum. Antennal funicle 7-jointed, in great part rufotestaceous, club piceous, Prothorax one-half as wide as the elytra, sides parallel in basal two-fifths, hind angles nearly rectangular, punctuation dense but only moderately coarse. Elytra elongate oval, scarcely impressed, striae distinctly impressed, intervals somewhat rugose. Length, 2.35 mm.; width, 1.2 mm.

Type.—From Algonquin, Illinois (Nason). A second specimen also from northern Illinois in Mr. Blanchard's collection.

By Dietz's table this falls near *parvicollis*, which is a somewhat stouter species with more evidently impressed elytra and shorter blackish pubescence. The resemblance to *palli-*

cornis is closer, but this has a 6-jointed funicle, the form is slightly more slender, the prothorax relatively smaller, the pubescence less conspicuous and the elytral striae less impressed.

CONOTRACHELUS Sch.

C. atokanus n. sp.—Form and size of *pusillus*, brown or piceous, densely clothed with subcontiguous oblong oval ochreous and white scales and sparse short recurved bristles, which are difficult to detect except in profile. The ochreous scales predominate and determine the general color; the white ones are aggregated in small spots on either side of the middle and at the sides of the prothorax, at the base of the third elytral interspace and at the anterior and posterior thirds of the elytral disk, the latter also with scattered small blackish areas which are due as much to exposure of the derm as to the color of the scales. Beak rather stout, moderately curved, but slightly longer than the prothorax in the ♂, a little longer in the ♀, sulcate and clothed with filiform scales behind the insertion of the antennae, which in the ♂ is at the apical third, and in the ♀ at about the middle; beyond the antennae rather coarsely punctate in the ♂, smoother and more finely punctate in the ♀. Prothorax wider than long, sides parallel and feebly arcuate in basal half, narrowed in front with moderate apical constriction; surface neither densely nor very coarsely punctate, entirely without sulci or costae. Elytra two and two-thirds times as long and a little less than twice as wide as the prothorax, one-third longer than wide, humeri nearly rectangular, narrowly rounded, sides straight and parallel for about half their length, then gradually narrowed and parabolically rounded at apex; strial punctures rather fine, the intervals wider than the striae, feebly convex, the alternate ones not appreciably more prominent except on the declivity. Beneath sparsely clothed with squamiform hairs or narrow scales, punctuation not very coarse, that of the ventral segments uniform and rather close. Mesosternum not protuberant; thighs feebly annulated and armed with a small tooth; claws with an acute basal tooth. Length, 2.8 mm.; width, 1.5 mm.

Type.—♂; from Atoka, Indian Territory. Three examples collected by Prof. Wickham.

One of our smallest species, resembling in a general way *pusillus*, but differing by the completely non-costate elytral intervals, non-protuberant mesosternum and generally finer punctuation. *Pusillus* seems to be very rare in collections. Two specimens, agreeing in all essentials with the type, were taken by the writer many years ago near Providence, Rhode Island. It was described from Florida.

C. floridanus n. sp.—Form oblong oval, nearly as in *pusillus*, piceous, tibiae and tarsi rufopiceous, closely though not very densely, somewhat unevenly clothed with narrow scales and squamiform hairs, mostly ochreous in color but sparsely intermixed with white, the latter condensed in a short transverse fascia at the summit of the elytral declivity, and in a few very small spots on the costae. One example shows four very small white spots, each consisting of from four to six squamules, arranged in a median transverse series on the prothorax, these being nearly obsolete in a second example. Beak moderately stout, about one-third longer than the prothorax in the ♂, about one-half longer than the prothorax in the ♀, shining and sparsely finely punctate apically, more coarsely punctate and substriate basally, a distinct punctiform fovea between the eyes. Antennae inserted barely visibly in advance of the middle (♂) or slightly behind the middle (♀); second and third funicular joints equal and each as long as the third and fourth united, the third slightly longer than the fourth. Prothorax not much wider than long, sides parallel and feebly arcuate in more than basal half, rather suddenly narrowed and constricted in front, surface moderately coarsely and densely punctate, the median line narrowly rather feebly cariniform, becoming obsolete basally. Elytra fully one-half wider and two and one-half times as long as the prothorax, sides parallel in basal half, then gradually parabolically rounded at apex; alternate intervals 3–5–7–9 distinctly though not very strongly costate, strial punctures moderately coarse basally, much finer toward the apex. Mesosternum protuberant, ventral segments rather finely punctate, the third and fourth very sparsely and finely so, the last segment more closely punctured, broadly convex in the ♂, nearly flat in the ♀. Thighs with a moderate tooth; claws with a small and broad basal tooth. Length, 4.4–5 mm.; width, 2.2–2.4 mm.

Type.—From Miami, Florida. One pair.

In the table given by LeConte in the "Rhynchophora," *floridanus* must be placed near *posticatus*, from which it differs by its more conspicuous and coarser vestiture, more oblong form, less developed pronotal and elytral costae, and much sparser and finer ventral punctuation. In the ♀ type the posterior elytral fascia is ill-developed.

C. neomexicanus n. sp.—Rather closely similar in form sculpture and general facies to *elegans*, but much larger, vestiture rather coarse and denser, prevailing tint ochreous-brown, with the thoracic lines, posterior elytral band and femoral rings whitish. The elytral band is biarcuate anteriorly, most advanced on the second costa, and most developed posteriorly from the suture to the first costa, narrowed to the lateral margin, which it attains at a point opposite the first ven-

tral suture. There is a feeble incomplete pronotal carina. The beak is finely densely punctate, striate laterally toward the base, though not as conspicuously so as in *elegans*, median line cariniform basally; antennae inserted at middle. Ventral segments densely uniformly punctate, the first with a median longitudinal impression, the fifth rather broadly not deeply foveate at middle; all else nearly as in *elegans*. Length, 6.75 mm.; width, 3.15 mm.

Type.—From New Mexico.

A single example of doubtful sex. Though obviously related to *elegans* it is quite different from anything else in our fauna, and I have not been able to identify it with any Mexican species.

ACALLODES Lec.

A. lysimachiae n. sp.—Closely allied to *ventricosus* and *saltoides* and best described by comparison with these two species. In many respects it occupies an intermediate position. The prothorax is more nearly like *ventricosus*, but the sides are a little more oblique basally, the elytra are shorter and more ventricose than in *ventricosus*, not perceptibly longer than wide, humeri narrow and obtuse but distinct; elytral bands of narrow whitish scales, made up of elongate spots on the intervals, the spots inclining to be better developed but not appreciably more advanced on alternate intervals, as they are quite conspicuously in *ventricosus*. The space between the transverse bands is a trifle darker owing to the presence of fine blackish feebly clavate inclined hairs which are also present elsewhere on the intervals and are best observed in profile. The elytral striae are wider than in *ventricosus*, but less so than in *saltoides*. Middle and hind tibiae strongly unguiculate in the ♂; thighs scarcely toothed, In *ventricosus* the elytra are quite distinctly longer then wide, in *saltoides* wider than long according to Dietz, but in the single example before the length and width are almost exactly equal. The humeri are a little better developed in *ventricosus*, entirely wanting in *saltoides*, in which the thorax is much shorter and more rapidly narrowed from the base, the elytral striae deeper and wider, and the transverse bands ill-defined. The sutural white spot at base of elytra is present in all, but most distinct in *ventricosus*. In many specimens of *lysimachiae* the elytra are reddish-brown, in others dark brown, perhaps indicating different stages of maturity. Length, 2.5–3 mm.; width, 1.7–2 mm.

Type.—♂; from Tyngsboro, Massachusetts.

Taken abundantly in September on *Lysimachia stricta* by Mr. Frederick Blanchard, to whom I am indebted for a good series of specimens.

AULEUTES Dietz.

A. marionis n. sp.—Very broadly oval, pitchy brown, thinly clothed with very short concolorous hairs, with short intermixed white hairs which tend to aggregate in small scattered spots on the elytra. Beak stout, as long as the prothorax, coarsely densely punctate in feeble longitudinal sulci with raised lines between; front flat, densely punctate, orbital margins elevated. Antennal funicle 6-jointed, first three joints subequal in length, the first stouter, third just visibly shorter than the second and rather longer than the fourth and fifth together. Prothorax strongly transverse, sides parallel in basal two-fifths, apical constriction rather narrow and deep, front margin obtusely angulate each side of a small shallow median emargination, dorsal channel distinct, lateral tubercles small, acute, punctuation dense, moderately coarse. Scutellum very small but distinct, elongate, glabrous. Elytra fully as wide as long, three-fourths wider than the prothorax, humeri rather prominently rounded, sides thence gradually arcuately convergent to apex; strial punctures rather coarse, intervals alternately wider and strongly elevated, the wider ones especially roughened with small acute granules. Beneath coarsely punctured, metasternum obviously but not deeply emarginate for the tip of the beak. Legs rather slender, tarsi paler, tibiae with outer margins strongly curved near the knee but not angulate: claws with a very short acute basal tooth. Length, $2\frac{1}{4}$ mm.; width, $1\frac{3}{4}$ mm.

Described from a single specimen (type) taken at Marion, Massachusetts, by Mr. Frederick Blanchard. The facies is almost precisely that of *Craponius inaequalis*, the generic characters are, however, those of *Auleutes*. The 6-jointed funicle, with very long and subequal second and third joints, and the strongly elevated alternate elytral intervals, strongly characterize this species. Only one other species of the genus—the *tuberculatus* of Arizona—has a 6-jointed funicle, and in it the second and third funicular joints are shorter than the first, and the elytral intervals nearly equal in width and convexity.

BARIS Germ.

B. texanus n. sp.—Elongate oval, black, legs rufopiceous, upper surface somewhat dull from the density of the sculpture, the interspaces of the pronotum are, however, polished and of the elytra shining and feebly wrinkled; setae fine, short, recurved, distinct but not very conspicuous. Head sparsely punctate, transverse impression very broadly angulate in profile. Beak coarsely and densely punctate throughout, three-fourths as long as the prothorax, nearly evenly arcuate. Antennal funicle rather short and stout, basal joint less than twice as long as wide, seventh joint three-fourths as wide as the club

Prothorax one-tenth wider than long, sides very feebly arcuate and moderately convergent to apical fifth, then strongly arcuately narrowed to apex, which is about two-fifths as wide as the base; disk coarsely densely punctate, the punctures nearly in mutual contact throughout, median smooth line very narrow and not entire. Scutellum transverse, impressed. Elytra nearly three-fifths longer, and at the humeri one-fifth wider than the prothorax, just perceptibly narrowed from the humeri to apical third; striae rather coarse, feebly indistinctly punctate basally, intervals about one-half wider than the striae, interstitial punctures very coarse and close set, nearly as wide as the intervals, confused on the third and somewhat so for a short distance on several of the following intervals. Beneath coarsely closely punctate; prosternum nearly flat, separating the coxae by rather more than one-fourth their own diameter. Length, 3.9 mm.; width, 1.85 mm.

Type.—From Fedor, Texas.

This species is probably nearest *hispidula* Csy, but differs in numerous details from the description of that species, which is said to be brown, pronotal punctures separated by their own diameters, the elytral striae rather strongly punctured, the interspaces but slightly wider than the striae, each with a single series of punctures.

B. apricoides n. sp.—Oblong oval, rather strongly convex, dark piceous-brown, moderately shining, surface between the punctures minutely alutaceous, setae small but distinct, recumbent. Head minutely sparsely punctulate, transverse impression strong, broadly angulate in profile. Beak very short, thick, strongly arcuate in anterior outline, scarcely two-thirds as long as the prothorax, rather strongly and closely but not coarsely punctate. Antennae short, first funicular joint very little longer than wide, following joints strongly transverse, club robust oval, scarcely longer than the four preceding joints, the basal joint polished, nearly glabrous and constituting about one-half its mass. Prothorax scarcely one-sixth wider than long, sides broadly arcuate and distinctly convergent from the base to the anterior fifth, thence more strongly rounded to apex, which is about two-fifths as wide as the base; disc coarsely and densely punctate, the punctures separated by much less than half their own diameters as a rule, median impunctate line narrow and incomplete. Scutellum small, subquadrate, not or feebly impressed. Elytra slightly wider and not quite three-fourths longer than the prothorax, a little more than one-third longer than wide, sides nearly parallel, striae moderately coarse, intervals a little less than twice as wide as the striae, the second and third wider, each with a single series of coarse close set punctures which are confused only at the base of the second and third. Punctuation beneath

moderately coarse and close; prosternum broadly longitudinally impressed or concave at middle, separating the coxae by about two-thirds their own width. Length, 3.6 mm.; width, 1.65 mm.

The type is a ♂ from Cloudcroft, New Mexico, collected by Mr. Knaus. With it I have placed a series from the Chiricahua Mountains of Arizona (Clemence) and others from Nogales, Arizona (Nunenmacher). One ♂ from the Chiricahuas agrees almost perfectly with the type; the other examples are slightly stouter with the sides of the thorax a little less convergent though obviously so, and there is a more obvious confusion of the interstitial punctures of the second and third elytral intervals. This species is plainly close to *aprica* Csy, which is said, however, to be polished, prothorax one-third wider than long, with sides almost parallel and straight in basal two-thirds, and the elytral interspaces but slightly wider than the striae.

B. tectus n. sp.—Oblong oval, convex, black throughout, polished; setae long, white, subrecumbent and very conspicuous. Head finely sparsely punctate, transverse impression broadly angulate in profile. Beak stout, arcuate, not quite three-fourths as long as the prothorax, quite densely punctate. First funicular joint nearly twice as long as wide, second nearly as long as wide, following joints increasingly transverse; club oval, fully as long as the five preceding joints, polished and glabrous in about basal half. Prothorax not quite one-fifth wider than long, sides feebly arcuate, nearly parallel in basal half or two-thirds, apex scarcely two-fifths the basal width; disk coarsely densely punctate, punctures separated by one-third to one-half their own diameters, median smooth line narrow and incomplete. Scutellum small, subquadrate. Elytra a little wider and three-fifths longer than the prothorax, one-fifth longer than wide, sides parallel, striae moderate, intervals about two-thirds wider than the striae, second and third widest, interstitial punctures rather coarse, close set, and more or less irregular or confused on nearly all the intervals, except toward the apex. Beneath moderately coarsely closely punctate; prosternum feebly concave at middle, separating the coxae by slightly more than half their own diameters. Length, 3.4 mm.; width, 1.65 mm.

Type.—From Chiricahua Mountains, Arizona.

Described from a single example, apparently a male, collected and given me by Mr. V. L. Clemence.

By Casey's table this species would come between *vespertina* and *oblongula*. *Vespertina* differs in its piceous-brown color, the setae are said to be semi-erect and arranged with-

out order on the elytra, the prothorax is one-half wider than long, with the apex fully one-half as wide as the base, the elytra are relatively a little longer, and there are some other differences in detail. *Oblongula* differs notably in its dull strongly alutaceous lustre, the beak is shorter, the antennal club smaller, and there are many other differences obvious when descriptions are compared. In *tectus* the elytral setae are subequal in length to the width of the interspaces.

B. pruininus n. sp.—Oblong oval, black, moderately shining, with a pruinose aspect because of the numerous white setae, which are long, coarse, blunt at tip, and recumbent. Beak very short, stout, evenly arcuate, scarcely half as long as the prothorax, rather finely and not very closely punctate. Antennae nearly as in the preceding species, except that the club is here distinctly compressed. Prothorax densely punctate with a narrow median smooth line which is variable in distinctness; sides very broadly arcuate and feebly convergent from base to near the apex, thence more strongly but not very abruptly rounded, the apex about one-third as wide as the base. Elytra barely perceptibly wider than the prothorax, slightly gradually narrowed behind, intervals from two to three times as wide as the striae, the second and third widest, interstitial punctures confused on all the intervals for the greater part of their length. Prosternum feebly longitudinally concave at middle, separating the coxae by two-thirds to three-fourths their own diameters. Other characters nearly as in the preceding species. Length, 3.6–4 mm.; width, 1.8–1 95 mm.

Type.—From El Paso, Texas.

This and the preceding species are rather closely allied in a general way, and especially by the long conspicuous setae; the present one, however, is larger and more oval in outline, with shorter beak and more compressed antennal club.

B. nevadicus n. sp.—Narrowly oblong oval, black, polished, legs rufous; setae very fine, short and inconspicuous. Head finely sparsely punctate, transverse impression distinct, broadly angulate in profile. Beak stout, strongly arcuate, nearly four-fifths as long as the prothorax, rather strongly and closely punctate. First funicular joint fully two-thirds longer than wide, second nearly as long as wide, club rather small, scarcely longer than the four preceding joints. Prothorax one-fourth wider than long, sides very broadly arcuate and feebly convergent to apical fifth, thence strongly rounded to apex, which is one-half as wide as the base; surface rather coarsely and densely punctate, with narrow distinct and nearly entire smooth median line. Scutellum small, unimpressed. Elytra a little wider than and not quite twice as long as the prothorax, about one-third longer than wide; striae fine, deep,

scarcely visibly punctate, intervals a little more than twice as wide as the striae, second and third a little wider and fully three times as wide as the striae ; interstitial punctures fine and not very close on the inner intervals, on the outer intervals coarser and closer and about one-half as wide as the intervals. Beneath coarsely closely punctate, the abdomen more sparsely so, especially at the middle ; prosternum nearly flat, separating the coxae by slightly more than half their own diameters. Legs moderately punctate. Length, 3.75 mm. ; width, 1.7 mm.

Type.—From Ormsby County, Nevada (Baker).

The type is a male with abdomen at base strongly impressed. The prothorax being more than half as long as the elytra would lead the student to place this species under "16" in Casey's table ; but the other characters are more in harmony with the following species and lead us to "22" in the neighborhood of *sparsa*. The latter is smaller (2.8–3 mm.), dark rufopiceous in color, with distinctly sparser punctuation both of the pronotum and elytra.

PYCNOBARIS Csy.

P. nigrostriatus n. sp.—Oblong ovate, black, shining, clothed rather densely with robust parallel truncate or subtruncate recumbent white scales, which are on the average from three to four times as long as wide. Head minutely sparsely punctate. Beak robust, three-fourths as long as the prothorax, its anterior outline strongly evenly arcuate, posterior outline straight for the greater part of its length when viewed in profile ; punctuation close, forming rugae at sides, squamose laterally toward the base. Antennae nearly as in *pruinosa*. Prothorax very nearly as long as wide, sides convergent and nearly straight from base to apical fifth, then strongly rounded to the well marked apical constriction ; surface densely coarsely punctate, the punctures about one-third as wide as the scutellum and nearly in mutual contact. Elytra about one-third longer than wide, three-fifths longer and at the humeri about one-sixth wider than the prothorax, sides very feebly convergent from the humeri, discal striae coarse and deep, feebly punctate, glabrous ; iutervals but little wider than the striae, irregularly rather coarsely punctate and densely squamose, the white vestiture contrasting strongly with the black striae. Beneath densely punctured and squamose. Prosternum flat, nearly as wide between the coxae as the coxal width ; transverse impressed line or sulcus deep, midway between the coxae and the front margin. Length, 3.6 mm. ; width, 1.75 mm.

Type.—From Palm Springs, California (Fenyes).

Readily distinguished from our two previously described species by the coarser glabrous striae and narrow intervals of the elytra. The vestiture is much denser than in *pruinosa*.

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SUBSCRIPTION PRICE FOUR DOLLARS PER VOLUME.

THE BOMBIDÆ OF THE NEW WORLD.

BY HENRY J. FRANKLIN,

Of the Massachusetts Agricultural College, Amherst, Mass.

(Continued from Vol. xxxviii, page 486.)

PART II.—SPECIES SOUTH OF THE UNITED STATES.

TABLE FOR DETERMINATION OF QUEENS OF AMERICAN SPECIES OF BOMBUS SOUTH OF NORTHERN BOUNDARY OF MEXICO.*

Abdomen above entirely black or with only black and white pile.....1.
Abdomen with more of less yellow, ferruginous, or reddish pile above .. ..6.

1. Abdomen entirely black above ..... 2.
   Abdomen with more or less white pile above..... 5.
2. Thorax with more or less yellow pile on the dorsum.....**medius.**
   Thorax entirely black..... 3.
3. Malar space distinctly longer than its width at apex, fully one-third as long as the eye.....**kohli.**
   Malar space not longer than its width at apex ..... 4.
4. Pile very short and coarse .....**brevivillus** n. sp.
   Pile somewhat longer and finer than that of *brevivillus*. **niger** n. sp.
5. Dorsum of thorax usually with a large and well defined patch of white pile on the disc.....**funebris.**
   Dorsum of thorax with no definite patch of white pile.....21.
6. Abdomen above with more or less red-ferruginous plle..... 7.
   Abdomen above with no red-ferruginous pile .....27.
7. Hairs fringing corbiculae entirely or almost entirely black..... 9.
   Hairs fringing corbiculae either entirely reddish-ferruginous or with a very strong admixture of that color..... 8.
8. Pleura yellow.....**ephippiatus.**
   Pleura ferruginous.....**handlirschi.**
9. Dorsum of thorax unicolorous.....10.
   Dorsum of thorax bicolored .....20.

* For convenience, there are included in these tables a few United States species which are known, or may be found, to range into Mexico somewhat. The descriptions of all such species are included with those of the other northern forms in Part I.

10. Coxæ, trochanters and femora clothed to a considerable extent with ferruginous pile.....**rubicundus.**
    Coxæ, trochanters and femora with little or no ferruginous pile..11.
11. Dorsum of abdomen with the first five segments clothed with reddish-ferruginous, or orange pile.....12.
    Dorsum of abdomen not having all the first five segments clothed with reddish-ferruginous pile.....13.
12. Occiput with a conspicuous triangle of reddish-ferruginous or orange pile; mesopleura bicolored; epipygium black. **dahlbomii.**
    Occiput black; mesopleura unicolorous; epipygium reddish-ferruginous .....**baeri.**
13. Mesopleura black or dark cinereous .....14.
    Mesopleura yellow .....19.
14. Second dorsal abdominal segment reddish-ferruginous.....15.
    Second dorsal abdominal segment entirely or mostly black.....17.
15. First dorsal abdominal segment black.....16.
    First dorsal abdominal segment clothed with ferruginous pile. **butteli.**
16. Malar space more than one-third as long as the eye....**carolinus.**
    Malar space less than one-third as long as the eye.....**coccineus.**
17. Dorsum of thorax black.....18.
    Dorsum of thorax yellow or reddish.....**emiliæ.**
18. Malar space slightly longer than its width at apex. **dolichocephalus.**
    Malar space distinctly shorter than its width at apex. **brachycephalus.**
19. The second and third dorsal abdominal segments bearing more or less reddish pile on the sides; the apical segments entirely black .....**pulcher.**
    Neither the second nor the third dorsal abdominal segment with reddish pile; the epipygium thinly sprinkled with pale ferruginous hairs.....**montezumæ** and **weisi.**
20. First dorsal abdominal segment entirely black.....**crotchii.**
    First dorsal abdominal segment clothed with yellow pile.....22.
21. Dorsum of thorax yellow, with a black interalar band. **robustus** var. **hortulans.**
    Dorsum of thorax unicolorous.....**volucelloides.**
22. Third dorsal abdominal segment red-ferruginous .....23.
    Third dorsal abdominal segment black.....24.
    Third dorsal abdominal segment yellow.....25.
23. The two apical dorsal abdominal segments red-ferruginous. **haueri.**
    The two apical dorsal abdominal segments black.....26.

24. The two apical dorsal abdominal segments red-ferruginous.
robustus
var. **rufocaudatus** (placed in this table on the color characters of the male).
The two apical dorsal abdominal segments with white pile.
robustus var. **cinctus.**
25. Fourth dorsal abdominal segment at least partly red or reddish-ferruginous.....49.
Fourth dorsal abdominal segment black.....**nigrodorsalis.**
26. Second dorsal abdominal segment clothed entirely with red-ferruginous pile .....**laticinctus** n. sp.
Second segment not so clothed.....**mexicensis** n. sp.
27. Both face and occiput heavily clothed with yellow pile.
vosnesenskii.
Face with little or no yellow pile .....28.
28. Dorsum of abdomen with the four basal segments clothed entirely with yellow pile.....29.
Dorsum of abdomen not so clothed.....30.
29. Mesopleura, to a considerable extent, clothed with yellow pile.
fervidus.
Mesopleura with little or no yellow pile.....**sonomæ.**
30. The two apical dorsal abdominal segments entirely dark.....31.
Either the epipygium or the segment before it, or both, with more or less white, whitish, yellow, or yellowish pile .....43.
31. All the dorsal abdominal segments beyond the second entirely dark .....32.
Not all the segments beyond the second entirely dark.....33.
32. Scutellum and first dorsal abdominal segment black.....**crotchii.**
Scutellum and first dorsal abdominal segment yellow..**fraternus.**
33. The fourth dorsal abdominal segment yellow.....**californicus.**
The fourth dorsal abdominal segment black..... .....34.
34. Mesopleura covered with yellow pile from the level of the bases of the wings to the bases of the legs.....35.
Mesopleura entirely or largely covered with black pile.....36.
35. The third dorsal abdominal segment entirely yellow.
brasiliensis.
The third segment yellow only in the middle.....**wilmattæ.**
36. Dorsum of thorax unicolorous.....37.
Dorsum of thorax bicolored.....38.
37. The two basal dorsal abdominal segments entirely or mostly black.....39.
The two basal dorsal abdominal segments yellow.....**morrisoni.**
38. The second dorsal abdominal segment yellow.....40.
The second dorsal abdominal segment black.....41.
39. Dorsum of thorax yellow.....**steindachneri.**
Dorsum of thorax black.....42.

40. The scutellum and first dorsal abdominal segment clothed with entirely yellow pile ..... **sonorus.**
The scutellum usually bearing entirely or mostly black pile and the first dorsal segment usually with considerable black pile on its front portion ..... **pennsylvanicus.**
41. The black interalar band more than one-half as wide (from front margin to rear margin) as long (from wing base to wing base) ..... **medius.**
The black interalar band not more than one-half as wide as long. **incarum** n. sp.
42. Malar space nearly one-fourth as long as the eye; length, 20 mm. to 24 mm..... **mexicanus.**
Malar space a little more than one-fifth as long as the eye; length, 20 mm. to 21 mm..... **medius.**
43. Dorsum of thorax unicolorous..... 44.
Dorsum of thorax bicolored..... 45.
44. Pleura black..... **ecuadorius.**
Pleura very pale yellow..... **montezumæ** and **weisi.**
45. The first two dorsal abdominal segments black ..... 46.
The first two dorsal abdominal segments yellow ..... 47.
46. Dorsal abdominal segments four to six, inclusive, clothed with white hair..... **robustus** var. **hortulans.**
The fourth dorsal segment yellow and the fifth mostly black. **trinominatus.**
47. Pleura yellow ..... **nigrodorsalis.**
Pleura black..... 48.
48. Dorsal abdominal segments three and four black. **robustus** var. **steinbachi.**
Dorsal segment three entirely or mostly yellow; segment four with entirely or mostly white pile..... **robustus** (typical).
49. Malar space fully as long as its width at apex ..... **opifex.**
Malar space not as long as its width at apex..... **sulfuratus.**

Table for Determination of Workers of Bombus South of Northern Boundary of Mexico.

With only black or black and white pile..... 1.
With more or less ferruginous-red, orange, ferruginous, or yellow pile ..... 5.
1. Entirely black ..... 2.
With more or less white pile..... 4.
2. Malar space somewhat longer than its width at apex ..... **kohli.**
Malar space somewhat shorter than its width at apex..... 3.
3. Pile very short and coarse ..... **brevivillus.**
Pile distinctly longer and finer than that of *brevivillus*..... **niger.**

4. Dorsum of thorax usually bearing a fairly well defined patch of white pile on the disc; the wings usually comparatively light. **funebris.**

   Dorsum of thorax with no definite white patch, most of the pile being dark cinereous; the wings usually rather dark. **volucelloides.**

5. With more or less yellow pile....15.
   With no yellow pile.... 6.
6. Dorsum of thorax ferruginous-red or ferruginous-orange.... 7.
   Dorsum of thorax black or cinereous.... 9.
7. Dorsum of abdomen with the first five segments clothed with entirely ferruginous or orange pile ....**dahlbomii.**
   Dorsum of abdomen not so clothed.... 8.
8. Pleura black ....**emiliæ.**
   Pleura ferruginous....**rubicundus.**
9. Dorsum of thorax and pleura concolorous ....10.
   Pleura colored differently from dorsum of thorax...**handlirschi.**
10. First three dorsal abdominal segments black....11.
    Not all of the first three segments black ....12.
11. Malar space slightly longer than its width at apex. **dolichocephalus.**

    Malar space distinctly shorter than its width at apex. **brachycephalus.**

12. Dorsum of abdomen clothed entirely with ferruginous pile...**bæri.**
    Dorsum of abdomen not clothed entirely with ferruginous pile..13.
13. First dorsal abdominal segment black....14.
    First dorsal abdominal segment ferruginous....**butteli.**
14. Malar space more than one-third as long as the eye....**carolinus.**
    Malar space less than one-third as long as the eye.....**coccineus.**
15. With more or less reddish or ferruginous pile....16.
    With neither reddish nor ferruginous pile....25.
16. Dorsum of thorax unicolorous....17.
    Dorsum of thorax bicolored....19.
17. Dorsum of thorax yellow....**emiliæ.**
    Dorsum of thorax dark....18.
18. Epipygium entirely black....**pulcher.**
    Epipygium mostly ferruginous....**montezumæ** and **weisi.**
19. Second dorsal abdominal segment clothed with entirely red-ferruginous pile.... **laticinctus.**
    Second segment not so clothed....20.
20. First three dorsal abdominal segments entirely clothed with yellow pile ....21.
    Not all of the first three dorsal segments yellow....22.
21. Fourth, fifth and sixth dorsal abdominal segments ferruginous or reddish ....**opifex.**

Fourth dorsal segment entirely black and the fifth mostly so. **nigrodorsalis.**

Basal portion of fourth dorsal abdominal segment bearing yellow pile. ..... **sulfuratus.**

22. Scutellum and first dorsal abdominal segment yellow ..... 23.
Scutellum and first dorsal abdominal segment entirely or mostly black ..... **crotchii.**

23. All the dorsal abdominal segments beyond the second clothed with reddish or ferruginous pile..... **haueri.**
The apical portion of the abdomen not so clothed..... 24.

24. The two apical dorsal abdominal segments black.... **mexicensis.**
The two apical segments with white pile above. **robustus** var. **cinctus.**

25. Dorsum of abdomen entirely black ..... **medius.**
Dorsum of abdomen bearing more or less yellow or white pile... 26.

26. The two apical dorsal abdominal segments entirely dark..... 33.
One or both of the two apical dorsal segments bearing more or less yellow, yellowish or white pile ..... 27.

27. Dorsum of thorax unicolorous..... 28.
Dorsum of thorax bicolored..... 29.

28. Mesopleura yellow..... **montezumæ** and **weisi.**
Mesopleura black..... **ecuadorius.**

29. The first two dorsal abdominal segments yellow ..... 30.
The first two dorsal segments black ..... 32.

30. Pleura yellow..... **nigrodorsalis.**
Pleura black..... 31.

31. Third dorsal abdominal segment black. **robustus** var. **steinbachi.**
Third dorsal segment entirely or mostly clothed with yellow pile. **robustus** (typical).

32. Segment four of the abdomen yellow above and segment five mostly black ..... **trinominatus.**
Fourth and fifth dorsal abdominal segments both clothed with white pile..... **robustus** var. **hortulans.**

33. Fourth dorsal abdominal segment yellow..... 34.
Fourth dorsal abdominal segment black..... 37.

34. The first four dorsal abdominal segments clothed entirely with yellow pile..... 35.
Not all of the first four dorsal segments entirely clothed with yellow pile..... 36.

35. Mesopleura mostly yellow..... **fervidus.**
Mesopleura mostly black ..... **sonomae.**

36. Face and occiput clothed with mostly yellow pile.. **vosnesenskii.**
Face and occiput entirely or mostly black..... **californicus.**

37. The third, and only the third, dorsal abdominal segment bearing yellow pile..... 38.

Other dorsal segments than the third bearing yellow pile, the third either yellow or black ..... 42.

38. Dorsum of thorax unicolorous..... 39.
Dorsum of thorax bicolored ..... 41.

39. Dorsum of thorax black..... 40.
Dorsum of thorax yellow..... **steindachneri.**

40. Malar space nearly one-fourth as long as the eye..... **mexicanus.**
Malar space but little more than one-fifth as long as the eye. **medius.**

41. Black interalar band more than half as wide (from front margin to rear margin) as long (from wing base to wing base). **medius.**
Interalar band not more than half as wide as long..... **incarum.**

42. Dorsum of thorax unicolorous..... 43.
Dorsum of thorax bicolored..... 45.

43. Dorsum of thorax yellow..... 44.
Dorsum of thorax dark..... **ephippiatus.**

44. The two basal dorsal abdominal segments entirely covered with yellow pile..... **morrisoni.**
The two basal dorsal segments not entirely yellow. **steindachneri.**

45. All the dorsal abdominal segments beyond the second entirely dark ..... 46.
One of the dorsal segments beyond the second partly or entirely clothed with yellow pile..... 47.

46. Scutellum and first dorsal abdominal segment with little or no light or yellow pile..... **crotchii.**
Scutellum and first dorsal segment clothed with entirely or mostly yellow pile..... **fraternus.**

47. Pleura yellow..... 48.
Pleura black..... 49.

48. Third dorsal abdominal segment clothed with yellow pile from side margin to side margin..... **brasiliensis.**
Third dorsal segment bearing yellow pile on its middle portion only..... **wilmattæ.**

49. Scutellum and first dorsal abdominal segment well clothed with yellow pile..... **sonorus.**
Scutellum usually either mostly or entirely dark and the first dorsal segment usually with considerable black pile on its front portion ..... **pennsylvanicus.**

Table for Determination of Males of Bombus South of the Northern Boundary of Mexico.

With only reddish-ferruginous, dark cinereous, or black pile (except *coccineus*, which often has white pile on the apical dorsal abdominal segments ..... 1.

With more or less pile of a color other than reddish-ferruginous, dark cinereous, or black ..... 13.

1. At least the upper halves of the mesopleura clothed with orange or ferruginous pile ..... 2.

   Mesopleura with no reddish or ferruginous pile ..... 4.

2. Malar space fully as long as its width at apex ..... **dahlbomii.**

   Malar space much shorter than its width at apex ..... 3.

3. Dorsum of thorax cinereous ..... **handlirschi.**

   Dorsum of thorax ferruginous ..... **rubicundus.**

4. Abdomen with not more than one dark segment above ..... 5.

   Abdomen with more than one dark segment above ..... 7.

5. Malar space considerably longer than its width at apex. **carolinus.**

   Malar space not longer than its width at apex ..... 6.

6. First dorsal abdominal segment black ..... **coccineus.**

   First dorsal abdominal segment reddish or ferruginous ..... **baeri.**

7. Eyes swollen and bulging out from the sides of the head much more than those of the females; the ocelli placed far below the supra-orbital line ..... **brachycephalus.**

   Eyes not swollen noticeably; the ocelli near the supra-orbital line ..... 8.

8. Dorsum of thorax black ..... 9.

   Dorsum of thorax dark reddish-ferruginous ..... **emiliæ.**

9. Apical dorsal segments of abdomen with little or no reddish-ferruginous pile ..... 10.

   Apical dorsal segments of abdomen with much reddish-ferruginous pile ..... **dolichocephalus.**

10. Third antennal segment longer than the fourth ..... **solus.**

    Third antennal segment at most not quite as long as the fourth .. 11.

11. Volsellæ of genitalia extending considerably beyond the tips of the squamæ ..... 12.

    Volsellæ not extending far beyond the tips of the squamæ. **atratus.**

12. Volsellæ of genitalia with three nearly equal lobes at the end. **kohli.**

    Volsellæ of genitalia with two apical lobes each, these lobes distinctly smaller than the prominent rounded projection on the inner side ..... **pullatus.**

13. Eyes swollen more or less; ocelli placed considerably below the supra-orbital line, the lateral ones very much nearer to the eye margins than to each other ..... 14.

Eyes like those of the females; ocelli placed near the supra-orbital line, the lateral ones at most not much nearer to the eye margins than to each other .....26.

14. Second dorsal abdominal segment clothed entirely with yellow pile.....15.

Second dorsal segment mostly or entirely black.....23.

15. Third dorsal abdominal segment partly or entirely clothed with black or ferruginous pile.....17.

Third dorsal segment clothed entirely with yellow pile.....16.

16. Apical dorsal abdominal segments with white pile.....**robustus.**

Apical dorsal abdominal segments with reddish or ferruginous pile. **haueri.**

Apical dorsal abdominal segments entirely black.....**morrisoni.**

17. Thorax clothed entirely with black pile.....**ecuadorius.**

Thorax not so clothed.....18.

18. Apical dorsal abdominal segments bearing more or less white pile. **tucumanus** or **weisi** var. **albocaudata.**

Apical dorsal abdominal segments with only black or ferruginous (of greatly varying shade) pile.....19.

19. At most not more than the last two of the apical dorsal segments of the abdomen bearing reddish-ferruginous (of varying shade) pile.....20.

More than two of the apical dorsal abdominal segments bearing reddish-ferruginous pile.....21.

20. Malar space shorter than the pedicel of the antenna...**fraternus.**

Malar space fully as long as the pedicel of the antenna.....48.

21. Dorsum of abdomen with all the segments beyond the second clothed entirely with reddish-ferruginous pile.....**haueri.**

Dorsum of abdomen with at least one of the segments beyond the second clothed partly or entirely with dark pile.....22.

22. From California and (northwestern Mexico?).....**crotchii.**

From South America .....**robustus** var. **rufocaudatus.**

23. Ocelli placed somewhat below the narrowest part of the vertex, the eyes converging somewhat above them ...**ramonensis.**

Ocelli exactly in or slightly above the narrowest part of the vertex, the eyes not converging above them.....24.

24. Dorsum of the thorax bearing a fairly well defined patch of white pile on the disc.....**funebris.**

Dorsum of thorax without white pile.....25.

25. Dorsum of thorax clothed with yellow pile in front and on the scutellum, with a black band between the wings. **robustus** var. **hortulans.**

Dorsum of thorax entirely or almost entirely black, there being often some yellow hair mixed with the black in front. **brachycephalus.**

26. The first four dorsal abdominal segments clothed entirely with yellow pile .....27.
Not all the first four dorsal segments clothed entirely with yellow pile.....30.
27. Either the mesopleura clothed with yellow pile to the bases of the legs, or the femora with considerable light pile, or both..28.
The mesopleura mostly dark and the femora with little or no light pile.....**sonorus.**
28. Apex of abdomen usually with a more or less noticeable amount of ferruginous pile; the mesopleura with their lower portion usually more or less noticeably darkened; pile of scutellum often with more or less strong admixture of dark hairs.
pennsylvanicus.
Apex of abdomen never with ferruginous pile; mesopleura always clothed entirely with yellow pile to the bases of the legs; scutellum never with an admixture of black hairs.....29
29. Yellow pile pale straw-yellow in color; the sixth dorsal abdominal segment clothed with mostly black pile.....**fervidus.**
Yellow pile of a richer, more golden, yellow color; the sixth dorsal abdominal segment clothed with mostly yellow pile.
sonomæ.
30. Dorsum of thorax unicolorous .....31.
Dorsum of thorax bicolored.....38.
31. Mesopleura yellow.....32.
Mesopleura entirely or mostly dark.....34.
32. The two apical dorsal abdominal segments bearing pale ferruginous pile .....**montezumæ.**
The two apical dorsal segments entirely dark.....33.
33. The sides of the second and third dorsal abdominal segments with more or less reddish-ferruginous pile..... .....**pulcher.**
The second and third dorsal segments with no reddish-ferruginous pile .....**ephippiatus.**
34. Dorsum of thorax yellow, reddish-ferruginous, or fusco-rufous..35.
Dorsum of thorax black.....36.
35. The last three or four dorsal abdominal segments yellow or rufo-ferruginous .....**emiliæ.**
Only the third and fourth dorsal abdominal segments bearing pile of a color other than black.....**steindachneri.**
36. The apical dorsal abdominal segment bearing considerable ferruginous pile .....37.
The apical dorsal segment with little or no ferruginous pile.
mexicanus.
37. The fifth and sixth dorsal abdominal segments black.....**medius.**
The fifth and sixth dorsal segments yellow or yellowish.
dolichocephalus.

38. The second and third dorsal abdominal segments distinctly reddish-ferruginous.....**laticinctus.**
The second and third dorsal segments not reddish-ferruginous..39.
39. Both the first and second dorsal abdominal segments mostly black..40.
Either the first, or the second, or both the first and the second dorsal segments clothed mostly or entirely with yellow pile...43.
40. Scutellum with little or no yellow pile .....41.
Scutellum with mostly or entirely yellow pile .....42.
41. Malar space shorter than its width at apex.....**vosnesenskii.**
Malar space somewhat longer than its width at apex.
californicus.
42. Squamæ of the genitalia extending considerably beyond the tips of the volsellæ; the epipygium with little or no ferruginous pile.....**incarum.**
Squamæ not extending beyond the tips of the volsellæ; the epipygium with considerable ferruginous pile .....**medius.**
43. Both the second and the third dorsal abdominal segments clothed with entirely yellow pile .....44.
Either the second or the third dorsal segment clothed in part with black pile.....47.
44. All the dorsal abdominal segments beyond the third reddish-ferruginous... .....**opifex.**
Not more than two of the dorsal abdominal segments bearing reddish-ferruginous pile.....45.
45. Fourth dorsal abdominal segment entirely yellow.....46.
Fourth dorsal abdominal segment bearing considerable black pile.
nigrodorsalis.
46. First dorsal abdominal segment entirely, or almost entirely, black.
medius.
First dorsal abdominal segment with mostly yellow pile.
pennsylvanicus.
47. Malar space distinctly longer than its width at apex.
californicus.
Malar space about as long as its width at apex.....**brasiliensis.**
48. Apical dorsal abdominal segments with only black hair.....**weisi.**
At least the two apical dorsal abdominal segments clothed largely with ferruginous pile (of varying shade).....**crotchii.**

Species of the Pratorum Group South of the United States.

Bombus (Bombus) trinominatus D. T.

‖ *Bombus modestus* Smith, Journ. of Ent., I, 1861, p. 153, n. 4, ♀ (not the ♀) (*nec* Cresson, *nec* Eversmann).
" " Cresson, Proc. Ent. Soc. Phila., II, 1863, p. 109, n. 21–22, ♀, not the ♀.

‖ *Bombus modestus* Cresson, Trans. Amer. Ent. Soc., VII, 1879, p. 230 (Catal.).

" *trinominatus* Dalla Torre, Wien. Ent. Zeit'g, IX, 1890, p. 139.

" " Cockerell, Catal. Abej. de Mexico, 1899, p. 19 (Catal.).

Type.—Smith's *modestus* queen is probably still extant in the collection of the British Museum, but Col. C. T. Bingham failed to establish its identity for me.

Malar space rather long. Clypeus smooth, but very delicately punctate. Head dark. Dorsum of thorax yellow in front, but black between wings and with only a slight admixture of yellow hairs on the scutellum. Pleura black. Dorsum of abdomen mostly black, except the third and fourth segments clothed with yellow pile. Legs dark.

Queen. Head.—With little or no light or yellow pile. Malar space longer than its width at apex, nearly one-third as long as the eye. Clypeus very smooth and shining, with very delicate punctures.

Thorax.—Dorsum in front of wing bases covered with yellow pile, between the wing bases black, and on the scutellum black except for a noticeable, though slight, admixture of yellow hairs. Mesopleura entirely black from the level of the bases of the wings to the bases of the legs. Metapleura and sides of median segment entirely black.

Abdomen.—Dorsum: segments one and two black; segments three and four entirely covered with bright yellow pile; segment five mostly black, but with its apical margin fringed with yellow hairs; segment six with a thin clothing of yellow pile. Venter mostly dark, but with the apical margins of the third and fourth segments fringed with yellow pile.

Wings.—Moderately dark.

Legs.—With all pile black, including the corbicular fringes.

Worker and *male.*—Unknown.

Dimensions.—Length of queen about 19 mm.

The queen is here redescribed from two specimens in the collection of the American Entomological Society.

Habitat.—Mexico (Oaxaca).

I think this species belongs to the *Pratorum* group and has its closest relative in *vosnesenskii*. It resembles quite closely, in general appearance, the queen of *californicus*, but it may be readily separated from that species by its much smoother clypeus and by its more chunky form as well as by certain differences in coloration.

Bombus (Bombus) laticinctus new species.

Types.—Described from seven worker cotypes and one male type, all collected by C. H. T. Townsend in Meadow Valley, head of Rio Piedras Verdes (six miles south of Colonia Garcia), Sierra Madre of western Chihuahua, Mexico—about 7,000 feet altitude. Of these specimens, one worker is deposited in the collection of the Massachusetts Agricultural College and the remainder in the collection of the United States National Museum.

Much like huntii, but with a much wider black interalar band.

Queen.—Unknown.

Worker. Head.—Face largely covered with yellow pile from the basal portion of the clypeus to some distance above the bases of the antennæ, this yellow pile with, at most, very little dark hair admixed and not nearly reaching the margin of the eye on either side. Occiput bearing a triangle of yellow pile, with or without an admixture of dark hairs. Sides of the head mostly dark. Malar space slightly shorter than its width at apex, about one-fifth as long as the eye. Clypeus coarsely but, for the most part, sparsely punctate. Third antennal segment much longer than the fifth; the fifth somewhat longer than the fourth.

Thorax.—Dorsum with a very broad black band between the bases of the wings, otherwise clothed with yellow pile; the black interalar band distinctly more than one-half as wide, from front to rear, as long, from wing base to wing base; the center of the disc, in the middle of the black band, with a naked, mostly smooth area. Mesopleura covered with yellow pile. Sides of median segment sometimes clothed with pure pale yellow pile and sometimes with a mixture of dark and yellow hairs.

Abdomen.—Dorsum: segments one and four clothed with yellow pile; segments two and three with ferruginous-red pile; segments five and six with black pile. Venter mostly dark, but with apical fringes of middle segments pale yellow. Neither the epipygium nor the hypopygium with a median carina.

Wings.—Only slightly infuscate, almost clear transparent.

Legs.—Somewhat variable. Clothing of tibiæ, including corbicular fringes, black. The femora mostly black, but the lower sides of the basal portions of all three pairs often bearing some pale yellow hair. The trochanters sometimes entirely dark, but often clothed with more or less yellow hair on their lower sides. At least the middle and hind coxæ usually with some yellow pile.

Male. Head.—Rather elongate. Face, aside from a sprinkling of black hairs in front of the ocelli and next to the eye margins, clothed

entirely with pure yellow pile. Occiput bearing a large triangular patch of pure yellow pile. Ventro-lateral portions of head bearing mostly yellow hair. Beard of mandibles heavy and ferruginous. Malar space slightly longer than its width at apex, about one-fifth as long as the eye. Clypeus, for most part, densely covered with pure yellow pile. Third and fifth antennal segments subequal, the fourth shorter than either.

Thorax.—Coloration of pile much like that of the worker; metapleura and sides of median segment rather heavily clothed with pure yellow pile.

Abdomen.—Dorsum: segments one and four yellow; segments two and three ferruginous-red; segment five mostly black, but with a sprinkling of yellow hairs on the extreme sides; segments six and seven black. Venter with the apical margins of most of the segments heavily fringed with pale yellow hairs.

Genitalia.—About like those of *huntii*.

Wings.—Only very slightly infuscate; the fore pair clear transparent, except in the region beyond the veins, this region being slightly darker than the remaining portion.

Legs.—Coxæ, trochanters and femora all clothed very largely with yellow pile, the femora, however, with dark hair on their upper sides and around their distal ends. Fore and middle tibiæ mostly dark. Hind tibiæ with outer faces flat, or slightly convex, and very sparsely hairy, almost entirely bare, their fore and hind fringes moderately long, forming distinct, though weak, corbiculæ, and rather strongly pale ferruginous. Hind metatarsi with their outer faces somewhat concaved, their hind fringes moderately long toward their bases, but short toward their apices.

Dimensions.—Length: worker, 10 mm. to 12½ mm.; male, about 12 mm. Spread of wings: worker, 25 mm. to 27 mm.; male, 26½ mm.

This species is very closely related to *huntii*, from which I have been unable to separate it structurally and of which it may really be a subspecies. The yellow pile of this species varies from a pale straw-yellow to a light gold. The red pile is normally quite a deep red, and has both red and orange or ferruginous values.

Bombus (Bombus) ephippiatus Say.

Bombus ephippiatus Say, Boston Journ. Nat. Hist., I, P. 4, 1837, p. 414, n. 2.

" " Smith, Cat. Hym. Brit. Mus., II, 1854, p. 399, n. 56.

" " Le Conte, Writ. of Th. Say Ent., 1859, p. 788, n. 2.

Bombus ephippiatus Greene, Ann. Lyc. Nat. Hist. New York, VII, 1860, p. 171, n. 7.
" " Cresson, Proc. Ent. Soc. Phila., II, 1863, p. 107, n. 41.
" *lateralis* Smith, Descr. New Spec. Hym., 1879, p. 134, n. 11, ♀.
" *ephippiatus* Cresson, Trans. Amer. Ent. Soc., VII, 1879, p. 230 (Catal.).
" " var. *lateralis* Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 233, ♀.
" " Dalla Torre, Cat. Hym., X, 1896, p. 518.
" " var. *lateralis* Dalla Torre, Cat. Hym., X, 1896, p. 518.
" " Cockerell, Cat. Abej. de Mexico, 1899, p. 19 (Catal.).
" *schneideri* H. Friese, Zeitsch. f. Systemat. Hym. und Dipt., III Jahrg., Heft 4, July 1, 1903, p. 253, ♀.
" " var. *fuliginosus* H. Friese, id., ♀.
" *ephippiatus* var. *lateralis* Crawford, Trans. Am. Ent. Soc., XXXII, 1906, p. 157, ♀, ♂.

Type.—Say's type of *ephippiatus* is, of course, lost. Smith's worker type of *lateralis* is in the collection of the British Museum and Col. C. T. Bingham was able to identify it for me. Friese writes me that his type specimens of *schneideri* (the queen cotypes) are in his private collection. He has sent me a specimen of *schneideri* in good condition. The male is here described for the first time, from two cotypes, one of which is deposited in the collection of the United States National Museum and the other in the collection of the Massachusetts Agricultural College.

The species is pecutiar in that the workers and males do not resemble the queens in coloration. Malar space of females short. Queens, workers and males with the sides of the thorax, the first abdominal segment and the disc of the second yellow. Queens with dorsum of thorax, sides of dorsal abdominal segment two and segments three, four and five ferruginous. In the males and workers, this ferruginous pile of the queens is replaced by black. Pile of medium length, thick and rather fine.

Queen. Head.—Mostly dark as a rule. Face and occiput often entirely black, but usually with a more or less strong admixture of dark ferruginous hairs. Clypeus sometimes with a sprinkling of ferruginous hairs. Labrum with fringes rather long and ferruginous. Sides of head, behind the eyes, dark. Malar space shorter than its width at the

apex, about one-sixth as long as the eye. Clypeus, for most part, moderately and rather finely punctate, coarsely punctate on anterior corners. Third antennal segment somewhat longer than the fifth, the fifth somewhat longer than the fourth.

Thorax.—Dorsum covered with deep rich ferruginous pile, the very center of the disc bare, smooth and shining. Mesopleura covered with yellow pile to the bases of the legs. Metapleura mostly clothed with yellow. Extreme sides of median segment usually with considerable yellow pile.

Abdomen.—Dorsum : segment one bright yellow ; segment two from about one-third to one-half clothed with yellow pile, this yellow covering the middle portion of the segment in the form of a patch reaching from the front to the hind border of the segment and somewhat wider in front than behind, the sides of this segment rich fox-red ; segments three, four and five all clothed with deep rich fox-red pile ; segment six mostly dark. Venter mostly dark, but the apical fringes of most of the segments ferruginous, at least toward the sides.

Wings.—Rather light, only very moderately infuscate.

Legs.—Coxæ mostly dark, but sometimes with a little light pile near their apices. Fore and hind trochanters usually mostly dark, but often with some yellow hairs, and sometimes the hind pair with considerable light pile on their lower sides ; middle trochanters usually with much light pile on their lower sides. Femora very often entirely dark, but the middle pair often with considerable yellowish pile on their lower sides and the fore and hind pair sometimes with some light hair below. Fore and middle tibiæ usually entirely dark, the latter often with a noticeable amount of ferruginous hair mingled with the black on their outer sides, especially toward their distal ends. Hind tibiæ with corbicular fringes strongly ferruginous, *i. e.*, with ferruginous hairs more or less strongly intermixed with the black. Hind metatarsi with no long fringes.

Worker. Head.—Except for the fringes of the labrum and hairs on the mandibles, with only dark pile. Malar space and antennæ as in queen. Clypeus apparently somewhat smoother and rather more delicately punctate than that of the queen.

Thorax.—Dorsum covered with black pile ; the very center of the disc naked ; the very front part of the dorsum and the hind margin of the scutellum sometimes with an inconspicuous admixture of light yellow hairs. Pleura and sides of median segment clothed as in queen.

Abdomen.—Dorsum : segment one as in queen ; segment two as in queen, but with the ferruginous pile replaced by black and the yellow patch usually covering somewhat more than one-half of the segment ; segment three usually entirely dark, but sometimes with a few yellow hairs on the basal middle ; segments four, five and six all dark. Venter dark, sometimes with a few scattering yellow hairs.

Wings.—Very light, transparent, only slightly infuscate.

Legs.—Dark; the middle trochanters often with considerable pale yellow pile on their lower sides.

Male. Head.—Face with a large amount of yellow pile, the yellow more or less intermixed with black hairs and placed, for the most part, below the bases of the antennæ, being most conspicuous on the clypeus and strongly predominating there over the black; some yellow hairs intermixed with the black just above the bases of the antennæ. Occiput with a mixture of black and yellow pile, the black predominating. Ventro-lateral portions of head with a considerable amount of pale yellow hair. Mandibles with heavy ferruginous beards. Malar space about as long as its width at the apex, about one-sixth as long as the eye. Clypeus rather densely covered, for the most part, with mostly yellow pile. Third and fourth antennal segments subequal in length, the fifth much longer than either.

Thorax.—Coloration of pile much like that of worker, but the very front part of the dorsum and the hind margin of the scutellum usually with a more or less conspicuous admixture of yellowish hair.

Abdomen.—Dorsum: coloration of pile much like that of worker, but the yellow patch on the second segment somewhat larger, only the extreme sides of that segment being dark. Venter mostly dark, but with apical fringes of most of the segments yellow.

Genitalia.—Outer spatha much like that of *B. vagans* (fig. 131). Inner spatha much like that of *B. impatiens* (fig. 133). Claspers (fig. 177 and fig. 190) with apices of branches broadly rounded, as seen from dorsal side; squamæ single lobed, triangular, with the outer margin evenly outcurved from base to apex, and the inner margin evenly incurved in the middle, but outcurved in front and behind, the apex round pointed, the base only slightly wider than the apex of the branch; volsellæ long and slender, somewhat wider in middle than at apex, and with small apical projections. Sagittæ with the usual long shafts and sickle-shaped heads of the *Pratorum* group.

Wings.—Like those of the worker.

Legs.—Hind coxæ with much yellow pile on their outer sides. All the trochanters with much yellow hair below. The hind femora, and sometimes also the front ones, with a considerable amount of yellow pile on the lower sides of their basal portions. Tibiæ all dark, except for some ferruginous-yellow hairs mixed with the black in the hind fringe of the corbiculæ. Outer faces of hind tibiæ slightly convex and naked, except for a few scattering hairs; hind fringes long and front ones moderately so, forming rather distinct corbiculæ. Hind metatarsi with moderately long hind fringes, at least toward their basal ends; their outer faces nearly flat and with pubescence of two distinctly different lengths intermixed, the longer hairs being the more sparse.

Dimensions.—Length: queen, 16 mm. to 19 mm.; worker, 9 mm.

to 13 mm.; male, 12 mm. to 13 mm. Spread of wings: queen, 38 mm. to 39 mm.; worker, 20 mm. to 30 mm.; male, 28 mm. to 29 mm. Width of abdomen at second segment: queen, 9 mm. to 10 mm.; worker, 4 mm. to 6 mm.; male, about 5½ mm.

The queen is here redescribed from twelve, and the worker from eight, specimens.

Variation.—The difference between the typical *ephippiatus* worker and its color variant *lateralis* is that in the former there is some yellow hair on the basal middle of the third abdominal segment. The color variant *lateralis* is, however, by far the more common form and, for this reason, is in reality the typical form of the species.

The difference in coloration between the queen and the other castes is very remarkable. I place the different castes together here, as I do, on the authority of Mr. J. C. Crawford (vide supra), who states that many queens and workers were taken from the same nest at the Volcano Irazu, Costa Rica, by Prof. Lawrence Bruner in 1902.

Smith (vide supra) describes a worker color variant, which is not known to me, as follows: "Var. The yellow pubescence on the abdomen is on the sides only of the first and second segments."

Crawford (vide supra) says of the worker: "Pubescence of second and third abdominal segments sometimes reddish." I have not seen a worker, which I feel certainly belongs to this species, that shows this character, and I should be slow to consider that a worker with this character belonged to this species unless I found it in the same nest with typical forms of the species. I have not seen the specimens from Prof. Bruner's nest, but I should not be surprised to find that it did not contain such a worker. It seems to me that workers with this character are as likely to belong to *pulcher* as to *ephippiatus*. H. Friese (vide supra) has described a color variant of the queen as follows: "var.—thorax above and segments four to six fuliginous—pilose—var. *fuliginosus*." I have seen no specimen so colored.

Habitat.—We have the following certain records for this species: Mexico, Guatemala (Val de Fuego), Costa Rica

(Volcano Irazu, 6,000–9,000 feet; San Carlos; San José, 3,550 feet; Cartago, 4950 feet; La Estrella de Cartago, Zarsero), Colombia (Chiriqui), and Ecuador (one ♀). Judging from Crawford's records, the species must be confined to the mountains or highlands. He gives no record of finding a single specimen in collections of Hymenoptera, which he examined, from Guacimo (450 feet), Guapiles (1,000 feet), or Pozo Azul (near the Pacific Ocean), yet he speaks of it as the most common species taken and says that he received about one hundred workers from Cartago. Cockerell (Ann. and Magaz. Nat. Hist., Ser. 8, X, 1912, p. 21), after his original description of *wilmattæ*, makes the following remarks: "The original *B. lateralis* Sm., was described from the mountains of Guatemala, at a higher altitude than the localities of *wilmattæ*. I think it is probable that the difference is only racial, the form from the higher altitudes being more melanic."

This species has its closest ally in *B. pulcher*. The two species are alike structurally as far as I have been able to discover, except for certain differences in the genitalia of the males, and it is certain that the queens and workers of *pulcher* vary in coloration very markedly toward the coloration of the workers and males of *B. ephippiatus*. I think it quite possible that by sufficient collecting a complete gradation in coloration could be worked out between the workers of the two species. Between the queens, however, it would probably be impossible to find such a gradation. It should be noted that the two species have about the same range of habitat and are both apparently highland forms.

Montezumæ and *nigrodorsalis* are not at all closely related to *ephippiatus*, as they both belong to the *Dumoucheli* group. I am of the opinion that *wilmattæ* also belongs to the *Dumoucheli* group, but I have not seen the male of that species.

Bombus (Bombus) pulcher Cress.

? *Bombus formosus* Smith, Cat. Hym. Brit. Mus., II, 1854, p. 403, n. 77 (excl. patria), ♀.

" *pulcher* Cresson, Proc. Ent. Soc. Phila., II, 1863, p. 108, n. 42, ♀.

? *Bombus pulcher* Cresson, Trans. Amer. Ent. Soc., VII, 1879, p. 231 (Catal.).

" *ephippiatus* var. *pulcher* Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 233, ♀ ☿ ♂.

" " var. *pulcher* Cockerell, Cat. Abej. de Mexico, 1899, p. 19.

" " var. *pulcher* Dalla Torre, Cat. Hym., X, 1896, p. 518.

" *pulcher* Franklin, Ent. News, XVIII, 1907, p. 91.

Types.—Smith's *formosus* is probably still extant in the British Museum collection, and a comparison of some *pulcher* queens with the *formosus* type would probably settle once for all the old question as to whether there is an East Indian species closely resembling the American one in coloration. Smith's description of *formosus* deals mostly with coloration and, were coloration alone sufficient to determine a *Bombus* species, I should say that, without a possible doubt, *formosus* was *pulcher*. When I think, however, of such cases as the European *confusus*, which so closely resembles in coloration both *brachycephalus* and *dolichocephalus* of Central America, I hesitate to consider two forms the same, even when they are exactly alike in coloration, unless I know their structure is also the same. There are authentic specimens of Cresson's *pulcher* in the collection of the American Entomological Society. The type specimens of the worker and male castes are in the collection of the k. k. Hofmuseum at Vienna.

Pile of medium length and rather fine. Malar space of females short, of males medium. Head dark. Thorax dark on dorsum, but yellow on pleura. Dorsum of abdomen yellow in front and black behind, with ferruginous-red pile on the sides of segments two, three, and sometimes four—the last sometimes entirely red-ferruginous.

Queen. Head.—Fringe on labrum and hairs on mandibles dark yellowish-ferruginous, otherwise with black pile only. Malar space distinctly shorter than its width at apex, about one-sixth as long as the eye. Clypeus with disc sparsely and delicately punctate and margin coarsely punctate. Third antennal segment much longer than the fifth, the fifth somewhat longer than the fourth.

Thorax.—Dorsum clothed with black pile, but very often with a noticeable admixture of yellow hairs with the black on the front margin; the very center of the disc naked and shining. Mesopleura covered with yellow pile from the level of the tegulæ to the bases of

the legs (toward the head, however, the yellow does not reach up to the level of the tegulæ). Metapleura mostly or entirely clothed with yellow. Sides of median segment sometimes entirely dark, but usually with mostly yellow pile.

Abdomen.—Dorsum : segment one yellow ; segment two mostly yellow, but with the sides bearing reddish-ferruginous pile, the sides of the yellow area converging, and the ferruginous areas on each side enlarging, posteriorly ; segment three sometimes very largely covered with yellow pile, the yellow reaching back in the middle to the hind margin of the segment for more than one-third of the length of that margin, but often only the basal middle of the segment with yellow pile, the remainder, in any case, being reddish-ferruginous ; segments four, five and six black. Venter black. Hypopygium without median carina.

Wings.—Moderately dark, distinctly darker than those of *ephippiatus*, about like those of *haueri*.

Legs.—Usually black ; trochanters and bases of femora rarely with a few light or yellow hairs.

Worker.—Much like queen, but with lighter wings ; the yellow pile sometimes almost white ; the ferruginous-red pile paler than that of the queen.

Male. Head.—Face always with a noticeable admixture of yellow hairs on the clypeus, this color often strongly predominating ; often with this admixture of yellow continued upward to above the bases of the antennæ. Occiput usually entirely black, but often with a slight admixture of yellow hairs. Ventro-lateral portions of head sometimes entirely dark, but usually with more or less, and often with considerable, yellow hair. Malar space somewhat longer than its width at apex, about one-fifth as long as the eye. Clypeus mostly covered with pile. Third and fourth antennal segments subequal in length, the fifth much longer than either.

Thorax.—Coloration of pile like that of the females.

Abdomen.—Dorsum : coloration of the pile like that of the workers, but the ferruginous pile often faded out almost to yellow. Venter mostly, and sometimes entirely, dark, but often with the apical fringes of most of the segments yellow ; hypopygium usually with a tawny apical beard.

Genitalia.—Outer and inner spathæ much like those of *B. ephippiatus*. Claspers (fig. 154 and fig. 194) a good deal like those of *ephippiatus*, but with the apices of the branches, as seen dorsally, rather more quadrate and somewhat narrower in proportion to their preapical portions, and with the squamæ having their inner margins evenly incurved from base to apex and their bases considerably wider than the apices of the branches.

Wings.—Somewhat infuscate, far lighter than those of queen and, as a rule, somewhat lighter than those of worker.

Legs.—Coxæ sometimes entirely dark, but often with more or less yellow hair; trochanters sometimes entirely dark, but usually with a noticeable amount, and sometimes with a great deal, of yellow pile on their lower sides; femora usually with little or no light or yellow pile, but the hind pair often with some yellow hair on the lower sides of their basal portions and sometimes all three pairs with considerable yellow on the lower sides of their basal halves; tibiæ dark, except the hind fringes of the hind pair often more or less ferruginous-yellow, the outer faces of the hind pair slightly convex and naked, except for a few scattering hairs, and their hind fringes long, forming rather weak, but distinct, corbiculæ. Hind metatarsi with rather long hind fringes toward their bases; their outer faces flat or slightly concaved.

Dimensions.—Length: queen, 16 mm. to 20 mm.; worker, 12 mm. to 15 mm.; male, 9½ mm. to 13 mm. Spread of wings: queen, 37 mm. to 41 mm.; worker, 26 mm. to 31 mm.; male, 21 mm. to 31 mm. Width of abdomen at second segment: queen, about 9 mm.; worker, 5 mm. to 7 mm.; male, 4 mm. to 6 mm.

I have here redescribed this species from six queens, three workers and five males.

Variation.—The following variations, which seem distinct enough for description, are before me. They grade completely (the gradations are before me) into the typical forms above described.

Color Variant 1.—Queen like the typical queen, but with the ferruginous-red pile on the second and third dorsal abdominal segments largely, though not entirely, replaced with black, the replacement on the second segment consisting of a rather weak admixture of black hairs with the red on the extreme sides of the segment, and on the third segment consisting of a black area on the extreme sides, this area narrowing and extending half-way to the middle line along the front margin of the segment. One specimen from Olas de Moka, Department Solola, Guatemala—3,000 feet altitude.

Color Variant 2.—Worker like the queen of Color Variant 1, but with the black predominant on the sides of the second abdominal segment, there being only a moderately strong admixture of ferruginous-red hairs with the black, and with the outer two-thirds of each red patch on segment three completely replaced by black. One specimen from Olas de Moka, Department Solola, Guatemala—3,000 feet altitude.

Male Color Variant 1.—Like typical male described above, but with a weak admixture of black hairs with the ferruginous-red on the sides of segment two and with a very strong admixture of black hairs on the sides of segment three. One specimen from Olas de Moka, Department Solola, Guatemala—3,000 feet altitude.

Male Color Variant 2.—Like typical male, but with the middle two-thirds of the fourth dorsal abdominal segment clothed with yellow pile. A single specimen, taken in coitu with a typical queen at Ozumba, Mexico—8,088 feet altitude.

Male Color Variant 3.—Like the worker color variant in coloration. One specimen from Mexico.

Male Color Variant 4.—Like typical male, but with the fourth dorsal abdominal segment covered with ferruginous-red pile, except for a strong admixture of black hairs on its basal middle. One specimen from Ozumba, Mexico—8,088 feet altitude.

Habitat.—We have the following certain records for this species: Mexico (Ixtaceihautl, Popocatepetl—8,000 feet altitude, Ozumba, Jalapa), Guatemala (Olas de Moka—Department Solola) and Venezuela.

Pulcher is a very appropriate name for this species, for it is indeed a handsome one. It has its nearest ally in *ephippiatus*, the only marked structural difference between the two species being the difference in the form of the squamæ of the male genitalia.

Species of the Dumoucheli Group South of the United States.

Bombus (Bombus) montezumæ Ckll.

Bombus laboriosus Smith, Journ. of Ent., I, 1861, p. 153, n. 3, ♀ ☿.
" " Cresson, Proc. Ent. Soc. Phila., II, 1863, p. 109, n. 42 and 43, ♀ ☿.
" " Cresson, Tran. Amer. Ent. Soc., VII, 1879, p. 230 (Catal.).
" *ephippiatus* var. *laboriosus* Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 233.
" " var. *laboriosus* Dalla Torre, Cat. Hym., X, 1896, p. 518.
" " var. *laboriosus* Cockerell, Cat. Abej. de Mexico, 1899, p. 19.
? " *weisi* H. Friese, Zeitsch. f. System. Hym. und Dipt., Jahrg. III, Heft. 4, 1903, p. 253, ☿ (not the ♂).
" *ephippiatus* var. *laboriosus* Franklin, Ent. News, XVIII, 1907, p. 91.
" *weisi* Franklin, Ent. News, XVIII, 1907, p. 91.
" *ephippiatus* var. *montezumæ* Cockerell, Ann. Magaz. Nat. Hist., Ser. 8, I, 1908, p 344.

Types.—Col. C. T. Bingham failed to locate Smith's type specimens of this species in the collection of the British Museum for me. Yet it is, of course, possible that they may still be extant. Friese's type specimens of *weisi* are in his private collection. I am inclined to the opinion that the *weisi* ☿ was a worker of this species. I have before me a male *weisi*, determined by Friese, and this specimen is certainly not of this species. I here describe the true male for the first time from two cotypes of that sex, deposited in the collection of the United States National Museum.

Queen.—I have never seen either a queen or a worker of this species. Smith described these castes as follows: "*Female.*—Length 8 lines. Black, pubescent; the head entirely black, with the clypeus very smooth and shining and delicately punctured. The thorax with black pubescence above and beneath, that on the sides pale yellow; the pubescence on the legs entirely black; the wings fusco-hyaline, the nervures black. Abdomen: the three basal segments clothed with pubescence of a pale yellow, somewhat lemon-colored, that on the third segment not quite extending to the lateral margins; the apical segment thinly sprinkled with ferruginous hairs."

"*Worker.*—Length 5 lines. Colored like the female."

Handlirsch described the queen and worker together, from two specimens of each caste as follows: "Thorax as in *pulcher;* abdomen with the first and second segments entirely yellow haired, the third segment yellow in the middle; fox-colored or brown pile absent; the sixth segment is pale reddish haired."

Friese's description of the worker is as follows: "Black, black-haired; like *B. ephippiatus* var. *lateralis*, but larger; segments 1–3 yellow-, 4–5 black-, 6 red-haired; with longer cheeks. Length, 15 mm.; width of thorax, $7\frac{1}{2}$ mm."

Male. Head.—Face with a mixture of dark and pale yellow hairs; occiput with dark brown or black pile; sides of head, beneath and behind the eyes, with considerable pale yellow pile (most of this light pile is well under the head, the sides immediately behind the eyes being mostly dark). Malar space apparently somewhat longer than its width at apex, about one-fourth as long as eye. Clypeus shining, finely punctate toward the side and upper margins, but sparsely and delicately punctate over a considerable portion of the disc. Third and fourth antennal segments subequal in length, the fifth nearly as long as

both together; most of the segments of the flagellum appearing slightly arcuate when viewed laterally (the first two segments and the apical one are not at all arcuate).

Thorax.—Dorsum clothed with dark brown or black pile; the front part with a noticeable admixture of pale yellow hairs; the very center of the disc naked, smooth and shining. Mesopleura covered with pale yellow pile from the level of the bases of the wings to the bases of the legs. Metapleura mostly clothed with pale yellow pile. Sides of median segment also with considerable pale yellow hair.

Abdomen.—Dorsum: segments one and two entirely covered with yellow pile; segment three either entirely clothed with yellow pile or with the greater part yellow and the extreme sides more or less dark; segment four covered with black pile; segment five mostly black, but with its very apical margin bearing pale ferruginous pile; segments six and seven with pale ferruginous pile. Venter dark, but most of the segments with long apical fringes of very pale yellow hairs.

Genitalia.—Claspers (fig. 183 and fig. 193) long and appearing moderately powerful; branches pointed at the apex, as viewed dorsally, with the very points rounded, these apices being bent strongly mesad; the squamæ weakly bilobed, the inner lobe being distinctly larger and more prominent than the outer one, and extending mesad far beyond the inner margin of the volsella (this inner lobe seems to take the form of a flat plate or scale more than is commonly the case with *Bombus* males), the outer lobe short and tending to be pointed, but with the very apex rather broadly rounded; volsellæ very long and extending considerably beyond the tips of both the sagittae and the squamæ, their apices blunt and quadrate and their outer margins evenly outcurved, hairs, except on the basal portion of their inner sides, being unusually wanting. Sagittae with shafts long and bent outward strongly in the middle, with a noticeable projection on the middle of the lower side of each; their heads reaching as far posteriorly as the apices of the squamæ, being somewhat foliaceous and recurved at the tip (this tip being rounded) and without noticeable spines, teeth or points. Uncus moderately broad behind, but tapering to a narrow recurved tip.

Wings.—Very light, but slightly infuscate.

Legs.—Coxæ mostly dark, the hind pair with a few yellowish hairs; fore and middle trochanters with a considerable amount of very pale yellow pile, the hind pair with only a very little light hair; the basal halves of the front, and sometimes also of the middle, femora with much pale yellowish hair on their lower sides, the remaining portions all being dark; the hind femora dark, sometimes with a few light hairs on the lower sides of their basal portions; tibiæ dark, the outer faces of the hind pair slightly convex and sparsely hairy and their hind fringes moderately long; hind metatarsi oblong, slightly concaved on their

outer sides, of nearly equal width throughout their length, without long hind fringes.

Dimensions.—Length: queen, about 17 mm.; worker, about 11 mm.; male, 12 mm. to 13 mm. Spread of wings: male, 26 mm. to 28 mm.

Variation.—The principal variation in this species is in the coloration of the third dorsal abdominal segment. If it seems desirable to give names to distinguish the form in which this segment is entirely yellow from the one in which its extreme sides are dark, possibly the name *weisi* must go with the former, while the name *montezumæ* indicates the latter, variation. Perhaps a new name should be given to the first form.

Habitat.—Our certain records for this species are: Mexico (Oajaca and Tlalpam) and Costa Rica (San Carlos).

This species has its nearest relative in *B. nigrodorsalis.* It may be distinguished from that species by its having the dorsum of the thorax dark, without the yellow band across the front part and without the yellow fringe on the hind margin of the scutellum. It may be at once separated from *pulcher*, *ephippiatus* and *wilmattæ* by the ferruginous hair on the apex of its abdomen and probably also by its somewhat longer malar space. I consider *montezumæ* and *nigrodorsalis* the most primitive of all the New World species of *Bombus.*

Bombus (Bombus) nigrodorsalis Franklin.

Bombus nigrodorsalis Franklin, Ent. News, XVIII, 1907, p. 90.
" " var. *laticollis* Franklin, Ent. News, 1907, p. 91.

Types.—Typical *nigrodorsalis* was originally described from one queen and one worker. These specimens together with five queens and one worker (paratypes) are in the collection of the United States National Museum. I do not now consider the form *laticollis* to be a good subspecies, but rather look upon it as a color variant. The specimen, from which this variant was described, was a queen. It is also in the collection of the United States National Museum. The type of the male, here described for the first time, is in the same collection. All these type specimens were collected by C. H. T. Townsend in Meadow Valley, head of Rio Piedras

Verdes (six miles south of Colonia Garcia), Sierra Madre of western Chihuahua, Mexico—about 7,000 feet altitude.

Malar space rather long. Head mostly dark. Dorsum of thorax yellow in front and with a posterior fringe of yellow on scutellum; pleura yellow; dorsum of abdomen of females with first three segments yellow, fourth black, fifth black with apical margin bearing ferruginous hairs, and sixth ferruginous. Dorsum of male abdomen with three basal segments yellow, the apical half bearing black, yellow and ferruginous hairs.

Queen. Head.—Face, occiput and ventro-lateral portions all black, except for a slight sprinkling of light hairs, visible with a lens, above the bases of the antennae. Labrum sulcate in the middle and fringed on free edge with ferruginous-yellow hair. Malar space distinctly longer than its width at apex, about one-third as long as eye. Clypeus rather smooth and shining and very delicately and sparsely punctate over the entire surface, except the corners. Third antennal segment somewhat longer than the fifth; the fifth distinctly longer than the fourth.

Thorax.—Mesopleura covered with light yellow pile from the tegulæ to the bases of the legs, the yellow of the two pleura being connected by a rather narrow band of the same color crossing the dorsum in front, this yellow band not nearly extending back on the middle of the dorsum to even with the tegulæ, but its hind border curving forward strongly from them on each side. Scutellum with a mere fringe of yellow hairs behind. Dorsum otherwise entirely covered with black pile, except for a very small bare spot on the center of the disc.

Abdomen.—Dorsum: first three segments clothed entirely and rather densely with bright yellow pile; segment four entirely dark; segment five mostly clothed with black pile, but with ferruginous hairs on its apical margin; segment six with ferruginous pile. Venter black towards the base, but with the apical fringes of the second, third and fourth segments light yellow; hair fringing the apical margin of the fifth segment and the entire sixth segment yellow. Hypopygium without median carina.

Wings.—Somewhat stained with brown.

Legs.—Middle and hind coxæ usually bearing some yellow hairs, but sometimes entirely black; femora all dark and bearing no light or yellow pile; front and middle tibiæ dark; hind tibiæ sometimes entirely and always mostly black, sometimes with some of the hairs in the hind corbicular fringes tinged with pale ferruginous color.

Worker.—Like the queen, except in size, but with corbicular fringes entirely black and the pile of the apical abdominal segment and the apical fringe of the fifth segment much less strongly ferruginous than in the queen.

Male. Head.—Face with only cinereous (black and whitish hairs mixed) pile. Occiput entirely dark. Ventro-lateral portions with mostly cinereous or pale pile. Malar space distinctly longer than its width at apex, nearly one-fourth as long as eye. Clypeus mostly naked and moderately punctate, the punctures over the greater part of the disc being for the most part rather delicate. Fifth antennal segment much longer than third and third much longer than fourth.

Thorax.—Coloration of pile much like that of queen and worker, but with the yellow pile on the front part of the dorsum reaching back to nearly even with the tegulæ all the way across; metapleura and sides of median segment clothed rather densely with pure pale yellow pile.

Abdomen.—Dorsum: segments one, two and three entirely covered with pale yellow pile; segment four mostly dark, but with apical margin bearing whitish yellow pile and with yellow hairs more or less admixed with the black, except on the very middle portion, the extreme sides having this yellowish admixture very strongly; segment five mostly dark, but with a fringe of whitish hairs on the middle of the apical margin; segment six dark, but with apical margin bearing ferruginous hairs; segment seven with ferruginous clothing. Venter with mostly whitish-yellow pile.

Wings.—Very light, almost clear transparent, only slightly infuscate.

Legs.—Coxæ all with some pale hair, at least on their outer sides; trochanters all with considerable pale pile on their lower sides; femora mostly dark, but at least the middle and hind pair with considerable pale yellow on the lower sides of their basal halves; tibiæ all dark. Outer faces of hind tibiæ convex and hairy, the hind fringes long and the front ones moderately so, forming very weak corbiculæ. Hind metatarsi with outer faces nearly flat and hind fringes, for most part, short.

Dimensions.—Length: queen, about 19 mm.; worker, about 12½ mm.; male, nearly 14 mm.

Variation.—The description of the color variant (*laticollis*) is as follows: Like typical *nigrodorsalis* queen, but with band of yellow pile, running across anterior part of dorsum of thorax, much wider and reaching back in the middle to even with the tegulæ. Middle and hind trochanters and bases of hind femora beneath bearing considerable yellow pile. Hind fringes of corbiculæ strongly ferruginous.

This species has its closest relative in *montezumæ*.

Bombus (Bombus) wilmattæ Ckll.

Bombus ephippiatus, var. d., Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 233, ♀.

Bombus lateralis wilmattæ Cockerell, Ann. and Magaz. Nat. Hist., Ser. 8, X, 1912, p. 21, ♀.

Bombus guatemalensis Franklin, Trans. Amer. Ent. Soc., XXXVIII, Jan., 1912, pp. 196 and 197.

Types.—The type of the queen caste, described here for the first time, came from Ecuador and is deposited in the collection of the United States National Museum. Cockerell's worker type came from Antigua, Guatemala. Handlirsch's specimen came from Guatemala. I have not seen Cockerell's type.

Pile rather short and fine. Malar space rather short. Head mostly dark. Dorsum of thorax pale yellow, with a black interalar band. Dorsum of abdomen with first segment yellow; second mostly yellow, but black on the extreme sides; third yellow in the middle and black on the sides; the remainder black. Corbicular fringes dark.

Queen. Head.—Face mostly dark, but with a slight sprinkling of pale yellow hairs above the bases of the antennæ. Occiput with a strong admixture of pale yellow hairs. Ventro-lateral portions of head mostly dark. Malar space shorter than its width at apex, about one-sixth as long as eye. Clypeus, for most part, delicately and rather sparsely punctate. Third antennal segment longer than the fifth, the fifth longer than the fourth.

Thorax.—Dorsum yellow, with a weak and poorly defined black interalar band, the yellow strongly encroaching on the black pile, especially near the bases of the wings. Mesopleura yellow to the bases of the legs. Metapleura mostly clothed with yellow, and sides of median segment with a large amount of yellow pile.

Abdomen.—Dorsum: segment one yellow; segment two about two-thirds clothed with yellow pile, this yellow portion being all in one area on the middle of the segment and extending from the front margin back to the hind one, the sides of this area converging posteriorly, the sides of the segment being black; segment three black, except for a patch of yellow on the middle third, the sides of this patch converging posteriorly, but not meeting; segments four, five and six black. Venter dark.

Wings.—Rather light, only moderately infuscate for a queen.

Legs.—Anterior and middle pair dark. Hind coxæ with considerable yellow hair on their outer sides; hind trochanters mostly dark; hind femora with a noticeable amount of yellow pile on the lower side of their very basal portions; corbicular fringes mostly dark. Hind metatarsi with no long fringes.

Worker.—Much like queen. Occiput sometimes entirely dark and sometimes with yellow pile strongly predominant; face sometimes en-

tirely dark and sometimes with yellow strongly predominant above the bases of the antennæ, there being all gradations between these two conditions on both face and occiput. Dorsum of thorax as in queen, but with interalar band broad and usually well defined (this band is of varying width in different individuals, reaching a maximum of two-thirds as wide, from front margin to rear margin, as long, from wing base to wing base). Yellow patch on third dorsal abdominal segment sometimes covering not more than one-fifth of the segment and sometimes covering nearly half of it, but usually covering less than one-third, its sides often rapidly diverging (instead of converging) posteriorly.

Wings.—Light, transparent, only slightly infuscate.

Legs.—Mostly dark; in all but one specimen, lacking the yellow pile present on some of the hind leg segments of the queen.

Male.—Unknown.

Dimensions.—Length: queen, about 15 mm.; worker, 11 mm. to 14 mm. Spread of wings: queen, 36 mm.; worker, 26 mm. to 29 mm. Width of abdomen at second segment: queen, about 7½ mm.; worker, 5 mm. to 6½ mm.

Habitat.—Guatemala (Quiché—one worker, Antigua—six workers, Guatemala City—four workers) and Ecuador (one queen and three workers).

This species apparently belongs to the *Dumoucheli* group and probably has its closest allies in *montezumæ* and *nigrodorsalis*. Its yellow pile is very pale yellow. The worker caste is here redescribed from four specimens, one of which was collected in Guatemala (Quiché) and the other three in Ecuador.

Bombus (Bombus) emiliæ D. T.

|| *Bombus thoracicus* Sichel, Ann. Soc. Ent. France, (4), II, 1862, p. 121, ♀ ☿ ♂; T. 14, F. 2 (♀) and 3 (♂).

? " *bellicosus* Smith, Descr. New Spec. Hym., 1879, p. 131, n. 1, ♀ (excl. patria).

" *thoracicus* Holmberg, Anal. Soc. Cient. Argent., VIII, 1879, p. 157, n. 2, ♀ ☿ ♂.

? " *muscorum* var. *Corsicus* Dalla Torre, Ber. naturw.-mediz. Ver. Innsbr., XII, 1882, p. 30, ☿ (excl. patria).

" *thoracicus* Holmberg, Actas Acad. Ci. Cordoba, V, p. 2, 1884, p. 118, n. 2, ♀ ♂ ☿.

" " Radoszkowski, Bull. Soc. Natural. Moscou, LIX, 1884, p. 79; T. 3, F. 29.

" " Ant. Handlirsch, Ann. Naturh. Hofmus. Wien, III, 1888, p. 235; T. 10, F. 4.

Bombus Emiliæ Dalla Torre, Wien. Ent. Zeitg., IX, 1890, p. 139.
" *thoracicus* Hudson, Nat. in La Plata, 1892, p. 154.
" " Dalla Torre, Cat. Hym., X, 1896, p. 559.
" " var. *fuliginosus* H. Friese, Zeitschr. für system. Hym. und Dipt., Jahrgang, IV, Heft. 3, 1904, p. 188.
" " Friese, Flora og Fauna (Denmark), 1908, p. 92.

Type.—At least a part of Sichel's type specimens are in the collection of the k. k. Hofmuseum at Vienna, as is also Dalla Torre's type of *corsicus*. Smith's *bellicosus* is, in all probability, *thoracicus*. The type of *bellicosus* is in the collection of the British Museum.

Malar space rather short. Females with dorsum of thorax varying from light yellow to ferruginous, with no black interalar band; pleura dark; dorsum of abdomen black, with the three apical segments ferruginous; legs black. Males with short malar space; third and fourth antennal segments subequal; coloration as in females, but with more or less yellow on pleura, abdomen variable and legs with considerable yellow pile.

Queen. Head.—Mostly black, sometimes with a slight sprinkling of yellow hairs among the black on the occiput or about the bases of the antennæ. Malar space a trifle shorter than its width at apex, not over one-fifth as long as eye. Clypeus coarsely punctate, but rather sparsely so on the front portion of its disc. Third antennal segment longer than fifth and fifth longer than fourth.

Thorax.—Dorsum clothed entirely with pile of a color varying from pale yellow to deep yellow and even to ferruginous-red, with no black interalar band. Pleura black from level of bases of wings to bases of legs.

Abdomen.—Dorsum: three basal segments entirely black (some specimens, however, with a considerable sprinkling of yellow pile on the basal middle of the second segment); three apical segments entirely covered with ferruginous-red pile. Venter for most part black, but with apical margins of apical segments fringed with yellowish ferruginous hairs. Hypopygium without median carina.

Wings.—Very dark, with slight violaceous reflections.

Legs.—Coxæ, trochanters, femora and tibiæ, including corbicular fringes, all black.

Worker.—Much like queen; but pile on dorsum of thorax tending to be paler and the ferruginous pile on the apical abdominal segments somewhat lighter, as a rule, than in that caste; wings somewhat lighter.

Male. Head.—Malar space considerably shorter than its width at

apex. Clypeus coarsely punctate, except for a small smooth area on the disc. Third antennal segment slightly shorter than fourth, the fifth nearly as long as the third and fourth taken together.

Thorax.—Coloration much like that of females, but the pleura with a strong sprinkling of yellow hairs intermixed with the dark.

Abdomen.—Dorsum : segment one black ; segment two mostly black, but with a strong admixture of yellow hairs on its basal middle ; segment three dark ; segments four to seven inclusive bright yellow (these segments are probably ferruginous in most specimens).

Genitalia.—I have not been able to examine these organs, but, as Handlirsch's and Radoszkowski's figures agree fairly well, I will here give Handlirsch's description of them: "Of the genitalia, the spatha (uncus) is broad at the base and strongly narrowed toward the end ; the squama is much broader than long, on the inner side drawn out into a moderately long peak. The sagittæ are, toward the end, bent slightly downward and outward and, in the same place, almost cut square off."

Wings.—Somewhat lighter than those of the worker.

Legs.—Trochanters and femora bearing considerable yellow pile. Hind tibiæ strongly convex on their outer sides. Hairs on tibiæ and tarsi very short.

Dimensions.—Length : queen, about 25 mm. ; worker, 15 mm. to 17 mm. ; male, 14 mm. Spread of wings : queen, about 46 mm.

The species is here redescribed from three queens, nine workers and one male, all in the collection of the Museum of Comparative Zoölogy at Cambridge.

Variation.—It seems evident, from the published descriptions, that the dorsum of the abdomen of the male is quite variable in coloration. In the original description, it is described as follows: "abdominal segments two and three rufo-cinereous." Handlirsch (vide supra) states that the dorsum of the male abdomen has the first three segments "tawny yellow or only the third and fourth black pilose," the apical segments being ferruginous. The following female variation is before me :

Worker Color Variant.—Like typical worker, but with only the apical portion of the fourth dorsal abdominal segment covered with ferruginous pile, its basal portion being entirely black. Friese (vide supra) describes a color variant of the queen as follows: "var. ♀. Thoracic dorsum dark brown instead of yellow haired.—Salta (N. Argentina) —var. *fuliginosus.*"

Habitat.—We have sure records for this species as fol-

lows: Uruguay (Montevideo), Argentina (La Plata, Salta, Tandil—very abundant, Juarez, Rosario, Cordoba, Buenos Ayres) and Brazil (Bahia). The Brazilian record ought, perhaps, to be considered doubtful.

This species probably has its closest ally in *steindachneri*. See the discussion, concerning *bellicosus*, following the description of *baeri*.

Hudson (vide supra) states that this species is common in La Plata. He says that it usually builds its nest in a depression on the surface of the ground under the shelter of a bush and that the nest is dome-shaped and consists of "small sticks, thorns and leaves bitten into extremely minute pieces."

Bombus (Bombus) steindachneri Handl.

Bombus Steindachneri Ant. Handlirsch, Ann. naturh. Hofmus. Wien, III, 1888, p. 239, ♀ ♂.
" " Dalla Torre, Cat. Hym., X, 1896, p. 551.
" " Cockerell, Cat. Abej. de Mexico, 1899, p. 19 (Catal.).

Type.—Handlirsch described this species from two workers and three males—from Brazil (Ypanema) and Mexico (Cuernavaca). These specimens are in the collection of the k. k. Hofmusuem at Vienna.

Pile rather short and of medium texture. Malar space medium. Dorsum of thorax yellow, without black interalar band; pleura dark. Abdomen of females dark, except the third dorsal segment yellow. Abdomen of male dark, with third and fourth dorsal segments yellow. Head of females black. Legs black. Hind tibiæ of male convex without and thickly covered with short hair.

Queen.—I have seen one queen, 21 mm. in length and with coloration exactly like that of the worker, in the collection of the American Entomological Society.

Worker. Head.—With black pile only. Malar space slightly shorter than its width at apex, about one-fifth as long as eye. Clypeus coarsely, but for most part very sparsely, punctate, a large part of the disc appearing mostly smooth. Third antennal segment distinctly longer than the fifth, the fifth longer than the fourth.

Thorax.—Dorsum entirely covered with yellow pile, except for a small bare area on the center of the disc, this yellow pile extending down onto the mesopleura is somewhat below the level of the bases of

the wings. Mesopleura, except their extreme upper parts, clothed with black pile. Each metapleuron with a more or less noticeable amount of yellow pile at its extreme upper end, just behind and beneath the base of the hind wing, otherwise entirely dark. Sides of median segment with dark pile only.

Abdomen.—Dorsum: segments one, four, five and six black; segment two usually entirely black, but sometimes with a little yellow pile on its basal middle; segment three clothed with yellow pile. Venter dark. Hypopygium without median carina.

Wings.—Rather dark, often with slight violaceous reflections.

Legs.—All dark and with black pile.

Male. Head.—Face with a strong admixture of pale yellow (whitish) hairs with the black, this pale color being somewhat predominant on the clypeus. Occiput with yellow pile strongly predominant over the black. Sides of head mostly dark. Malar space about as in worker. Clypeus mostly covered with pile. Third antennal segment very short, distinctly shorter than either the fourth or the fifth, about one and one-half times as long as the pedicel. All but the basal and apical segments of the flagellum of the antenna appearing more or less strongly arcuate when viewed laterally.

Thorax.—Coloration of pile about like that of worker.

Abdomen.—Dorsum entirely dark, except the third and fourth segments clothed with yellow pile. Venter mostly dark.

Genitalia.—Handlirsch describes these organs as follows: "The genitalia resemble very much those of *Bombus pennsylvanicus* and *cayennensis*, yet are distinctly different from those of both species; the branch is as slender as in the former species, and the squama and volsella are also entirely as in that species, but the sagittæ are as in *cayennensis*."

Wings.—About like those of the worker.

Legs.—Coxæ and trochanters with some light pile; femora and tibiæ all dark. Outer sides of hind tibiæ convex and slightly impressed near the apices; for the most part, evenly covered with short hair, with no long fringes. Hind metatarsi with no long fringes.

Dimensions.—Length: worker, 13 mm. to 16 mm.; male, about 16 mm. Spread of wings: worker, 33 mm. to 38 mm.; male, about 35 mm. Width of abdomen at second segment: worker, 6½ mm. to 8 mm.; male, about 7 mm.

The species is here redescribed from five workers and one male. It seems to be quite constant in its coloration.

Habitat.—Mexico (Cuernavaca and Tacubaya) and Brazil (Ypanema). All the specimens seen by me came from Mexico, the male being from Cuernavaca.

This species is evidently closely allied to *emiliæ*. All the yellow pile borne by this species is rather deep yellow.

Bombus (Bombus) opifex F. Sm.

Bombus opifex Smith, Descr. New Spec. Hym., 1879, p. 133, n. 10, ☿.
" " Ant. Handlirsch, Ann. naturh. Hofmus. Wien, III, 1888, p. 235, ☿.
" " Vachal, Rev. Ent. France, XXIII, 1904, p. 10, ♀ ☿ ♂.
" " Friese, Flora og Fauna (Denmark), 1908, p. 92.

Type.—Col. C. T. Bingham found and identified for me Smith's type specimen of this species in the collection of the British Museum.

Malar space rather long. Heads of females dark. Dorsum of thorax yellow, with a black interalar band. Pleura yellow to bases of legs. Three basal dorsal abdominal segments yellow, the remaining dorsal segments ferruginous-red or reddish. Corbicular fringes black. Wings of queens rather dark.

Queen. Head.—Shaped about like that of *fervidus* queen. For most part bearing only black pile, but with a very slight sprinkling of yellow hairs among the black about the bases of the antennæ; fringe of labrum dark ferruginous. Malar space somewhat longer than its width at apex, between one-third and one-fourth as long as eye. Clypeus rather strongly and rather evenly punctate, in the very middle smooth and shining. Third antennal segment longer than the fifth, the fifth longer than the fourth.

Thorax.—Front part of dorsum covered with yellow and hind margin of scutellum also with yellow pile, the rest of the dorsum being clothed with black pile so as to form a very broad black interalar band; the very center of the disc naked and shining. Mesopleura covered with yellow pile to bases of legs.

Abdomen.—Dorsum: first three segments entirely covered with yellow and the three apical segments with deep ferruginous-red pile. Venter mostly black, but with a little yellow pile on the side margins and with the apical margins of the apical segments fringed with yellowish-ferruginous hairs. Hypopygium without median carina.

Wings.—Considerably infuscate.

Legs.—Coxæ, trochanters, femora and tibiæ black. Corbicular fringes black.

Worker.—I have never seen a worker of this species. Smith's and Handlirsch's descriptions of this caste, however, show that it is much like the queen, except in size. Handlirsch says the wings of the worker are only slightly infuscate. Smith states that the ferruginous pile varies in brightness in different individuals. Vachal states that the queen is like the worker.

Male.—Unknown to me. Vachal describes this sex as follows: "The male has the hairs of the head black, mixed more or less with whitish; the third and fourth antennal segments are subequal, being

together a little longer than the fifth ; the hind metatarsus is rather thick, with very short hair."

Dimensions.—Length : queen, about 22 mm. ; worker (according to Smith and Handlirsch), 13 mm. to 14 mm. ; male (according to Vachal), 17 mm. to 18 mm.

Habitat. — Chile (Santiago), Argentina (Salta, Lara—4,000 meters altitude, and Mendoza) and Peru. Apparently a highland species. This species seems to have its nearest ally in *dolichocephalus*.

Bombus (Bombus) dolichocephalus Handl.

? *Bombus diligens* Smith, Journ. of Entom., V, 1861, p. 154, n. 5, ♀.
? " " Cresson, Proc. Ent. Soc. Phila., II, 1863, p. 110, n. 43–44, ♀.
? " " Cresson, Trans. Amer. Ent. Soc., VII, 1879, p. 230 (Catal.).
" *dolichocephalus* Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 244, ♀ ♂.
" " Dalla Torre, Cat. Hym., X, 1896, p. 518 (Catal.).
" " Cockerell, Cat. Abej. de Mexico, 1899, p. 19 (Catal.).

Types.—Handlirsch described *dolichocephalus* from three queens and two workers, which were all collected by Bilimek at Orizaba, Mexico. These specimens are in the k. k. Hofmuseum at Vienna. I here describe the male from two cotypes (also from Orizaba, Mexico), one of which is deposited in the collection of the United States National Museum and the other in the collection of the Massachusetts Agricultural College. See notes, following the description of *B. brachycephalus*, concerning Smith's type of *B. diligens*.

Pile rather coarse and of medium length. Head elongate. Malar space long. Wings very dark. Head, thorax, anterior part of abdomen and legs dark and with only dark pile ; apical segments of abdomen with ferruginous pile.

Queen. Head.—Elongate ; black and with black pile. Labrum as in *fervidus* queen ; malar space slightly longer than its width at apex, about one-third as long as eye ; clypeus, for most part, rather coarsely and sparsely punctate ; ocelli normal for subgenus *Bombus ;* flagellum of antenna nearly twice as long as scape ; third antennal segment much longer than fifth, fifth somewhat longer than fourth.

Thorax.—Clothed with black pile ; center of dorsal disc bare, smooth and shining.

Abdomen.—Dorsum: segments one, two and three black and with black pile (one specimen has a few ferruginous hairs on the middle of the first segment); segments four, five and six bearing ferruginous-red pile. Venter mostly dark, but with the apical fringes of the three apical segments ferruginous.

Wings.—Very dark, with violaceous reflections.

Legs.—Coxæ, trochanters, femora and tibiæ dark and with dark pile. Hind metatarsi about as in *fervidus*.

Worker.—Like the queen.

Male. Head.—Shaped like that of *fervidus* male—elongate triangular. Dark and with dark pile. Malar space distinctly longer than its width at apex, about one-fourth as long as eye. Clypeus about as in *fervidus* male. Flagellum of antenna fully four times as long as scape; fifth antennal segment much longer than third, third slightly longer than fourth; all antennal segments between third and apical more or less noticeably arcuate.

Thorax.—Clothed with black pile.

Abdomen.—Dorsum: segments one, two and three with only black pile; segment four either with the basal two-thirds black and the apical third light ferruginous or entirely covered with light ferruginous pile; segments five, six and seven clothed with light ferruginous pile. Venter mostly dark, but with the apical fringes of the three apical segments more or less ferruginous.

Genitalia.—Outer spatha (fig. 148) with hind margin broadly outcurved and evenly continuous with side margins; the front margin deeply and evenly incurved, the anterior lateral corners evenly rounded; the ventral surface, as a rule, only sparsely hairy. Inner spatha much like that of *fervidus* (fig. 101), but with hind margin of apical portion curving broadly outward in the midde. Claspers (fig. 171 and, fig. 196) in general much like those of *fervidus* and *pennsylvanicus*, but readily separated from those of those two species by the strong ridging on the middle of the inner side of the ventral surface of the volsella and by the angular form of the inner side of the apex of the branch as seen from the dorsal side. Sagittæ much like those of *fervidus*, but with the head strongly toothed on the outer side of its basal portion (strongly resembling *dahlbomii* in this respect). Uncus moderately broad and tapering gradually to a narrow, rounded, recurved apex.

Wings.—Somewhat lighter than those of the females.

Legs.—Coxæ, trochanters, femora and tibiæ all dark and with dark pile. Outer faces of hind tibiæ convex and hairy (sparsely so toward distal end); their fore and hind fringes very short. Hind metatarsi with no long hind fringes; their outer faces distinctly concave and with rather sparse pubescence.

Dimensions.—Length: queen, 18 mm. to 23 mm.; worker, 15 mm.

to 18 mm.; male, 12 mm. to 15 mm. Spread of wings: queen, 41 mm. to 43 mm.; worker, 33 mm. to 37 mm.; male, 30 mm. to 31 mm. Width of abdomen at second segment: queen, 9 mm. to 9½ mm.; worker, 6½ mm. to 7½ mm.; male, 5½ mm. to 6½ mm.

Queen and worker redescribed from two specimens of each caste.

Habitat.—I have the following records for this species: Mexico (Orizaba) and Guatemala (Olas de Moka—Dep't Solola—3,000 feet altitude—two queens).

This species, in my opinion, has its closest ally in *opifex*. It was probably on misdetermined specimens of this species that Smith (Cat. Brit. Hym. Brit. Mus., 1876) based his record of *lapidarius* from "Mexico."

Bombus (Bombus) kohli Ckll.

? *Bombus velutinus* Illiger, Magaz. f. Insectenk., V, 1806, p. 175, n. 63.
? " *violaceous* Lepeletier, Hist. Nat. Insect., I, 1836, p. 473, n. 24, ♀ ☿.
? " " Smith, Cat. Hym. Brit. Mus., II, 1854, p. 400, n. 61.
? " " Greene, Ann. Lyc. Nat. Hist. New York, VII, 1860, p. 174, n. 13, ♀.
? " " Cresson, Proc. Ent. Soc. Phila., II, 1863, p. 108, n. 44, ♀ ☿.
? " " Cresson, Trans. Amer. Ent. Soc., VII, 1879, p. 231 (Catal.).
? " " Holmberg, Anal. Soc. Cient. Argent., VIII, 1879, p. 156, n. 1, ♀ ☿ ♂.
‖ " *carbonarius* Ant. Handlirsch, Ann. naturh. Hofmus. Wien., III, 1888, p. 242, ♀ ☿ ♂; T. 10, F. 2 and 14.
? " *violaceous* Hudson, Nat. in La Plata, 1892, p. 154.
" *carbonarius* Dalla Torre, Cat. Hym., X, 1896, p. 513.
" " Ducke, Zeitschr. Syst. Hym. Dipt., I, 1901, pp. 31 and 63.
" " Vachal, Rev. Ent. France, XXIII, 1904, p. 10.
" *kohli* Cockerell, Ann. and Magaz. Nat. Hist., Ser. 7, XVIII, 1906, p. 75.
" *carbonarius* Strand, Joöl. Jahrb., 1910, p. 553.

Types.—St. Fargeau's specimens are probably still extant in the collection of the National Museum of France at Paris and, if they can be positively identified, it can probably be determined whether the name *violaceous* should be given to

this species or not. Handlirsch's types of *carbonarius* are in the collection of the k. k. Hofmuseum at Vienna, Austria.

Pile of medium length and texture. Black. Wings dark, with violaceous reflections. Malar space long.

Queen. Head.—Rather elongate and black. Mandibles as in the *Pratorum* group. Malar space distinctly longer than its width at apex, about two-fifths as long as eye. Clypeus moderately punctate with rather coarse punctures. Third antennal segment somewhat longer than fifth, the fifth somewhat longer than the fourth.

Thorax.—Clothed with black pile; the very center of the dorsal disc naked and smooth.

Abdomen.—Both dorsum and venter black. Hypopygium without median carina. Epipygium with a low, but distinct, longitudinal median carina on its apical two-thirds.

Wings.—Very dark and with violaceous reflections.

Legs.—Dark and with black clothing.

Worker.—Like the queen, but without median carina on epipygium.

Male.—Like the females in coloration. Mandibles with black beard. Antennæ very long, their segments feebly arcuate; third segment very short, cone-shaped, nearly three-fourths as long as the fourth, the fourth three-fourths as long as the fifth. Hind tibiæ flat on their outer sides and almost entirely naked in the middle of those sides; metatarsi of the hind legs short haired. Hypopygium slightly bent up at the end and fringed with light, moderately long hairs.

Genitalia.—Branch long; squama divided into two lobes and considerably reached by the volsella drawn out into three nearly equal processes; sagittæ bent outward and hook-shaped at end.

Dimensions.—Length: queen, about 21 mm.; worker, 14 mm. to 18 mm. Spread of wings: queen, about 50 mm.; worker, 32 mm. to 40 mm. Width of abdomen at second segment: queen, about $10\frac{1}{2}$ mm.; worker, about 7 mm.

I have here redescribed the queen from a single specimen and the worker from three specimens. I have not seen the male, but have made up the description of that sex, here given, from a translation of Handlirsch's description.

Habitat.—I have apparently certain records for this species as follows: Brazil (Rio de Janeiro, Rio Grande, Ypanema, Sao Paulo); Paraguay (Sapucay, Asuncion, Trinidad, Villa Encarnacion); Argentina (Tapia—600 meters altitude); Peru (Callanga); Ecuador (Santa Inez) and Venezuela. Ducke has recorded it from Macapá, Brazil.

Prof. T. D. A. Cockerell gave the name *kohli* to this spe-

cies because the name *carbonarius* had been preoccupied by *B. carbonarius* Menge, 1856, from Prussian amber. In the collection of specimens of South and Central American species before me, made up of specimens from a considerable number of different collections, there are only four specimens of this species while of *niger* there are fifty-two specimens. It seems probable, therefore, that both *velutinus* and *violaceous* were *niger*. It should be noted, however, that, when Handlirsch described this species, there were twenty-seven specimens of it in the collection of the Vienna Hofmuseum while there were apparently only thirty-six specimens of *niger*. So, while the chances seem to be in favor of Illiger's and St. Fargeau's having had *niger*, it is quite possible that they made their descriptions from specimens of either species or of both species mixed.

B. kohli appears to have its closest allies in *carolinus* and *dahlbomii*.

Bombus (Bombus) carolinus (L.) F.

Apis carolina Linné, Syst. Nat., Ed. 12, I, 2, 1767, p. 959, n. 40.
" " Fabricius, Syst. Ent., 1775, p. 379, n. 4.
" " Ph. L. Müller, Linné: Vollst. Natursyst., V, 2, 1775, p. 903, n. 40.
" " Fabricius, Spec. Insect., I, 1781, p. 475, n. 4.
" " Fabricius, Mant. Insect., I, 1787, p. 299, n. 4.
" " Olivier, Encycl. Méthod. Insect., IV, 1789, p. 64, n. 10.
" " Gmelin, Linné: Syst. Nat., Ed. 13ª, I, 5, 1790, p. 2781, n. 40.
" " Christ, Naturg. d. Insect., 1791, p. 127.
" " Fabricius, Ent. Syst., II, 1793, p. 316, n. 7.
Bombus carolinus Fabricius, Syst. Piez., 1804, p. 342, n. 1.
" " Illiger, Magaz. f. Insectenk., V, 1806, p. 172.
" " Latreille, Gen. Crust. and Insect., IV, 1809, p. 180 (s. descr.).
" " Smith, Cat. Hym. Brit. Mus., II, 1854, p. 398, n. 46.
? " " Greene, Ann. Lyc. Nat. Hist. New York, VII, 1860, p. 174, n. 12, ♀.
" " Cresson, Proc. Ent. Soc. Phila., II, 1863, p. 108, n. 43.
" *excellens* Smith, Descr. New Spec. Hym., 1878, p. 133, n. 9, ♀.
" *carolinus* Cresson, Trans. Amer. Ent. Soc., VII, 1879, p. 230 (Catal.).

Bombus carolinus Cresson, Syn. Hym. No. Amer., 1887, p. 307.
" " Ant. Handlirsch, Ann. naturh. Hofmus. Wien., III, 1888, p. 242, ♀.
" " Cockerell, Cat. Abej. de Mexico, 1899, p. 19 (Catal.).

Types.—The worker and male are here described for the first time, each from a single specimen. The worker is deposited in the collection of the United States National Museum and the male in the collection of the Massachusetts Agricultural College. These specimens are not in very good condition. The male is from Colombia and the worker from Pozuzo, Peru.

Pile rather long and rather fine. Head and malar space very long. Head and thorax black. First and last segments of dorsum of abdomen and legs of females black. Intermediate dorsal abdominal segments of the females ferruginous-red Male abdomen all ferruginous-red above, except first segment. Wings dark.

Queen.—I have never seen a queen of this species, but I am sure from Smith's and Handlirsch's descriptions that this caste resembles the worker very closely except in size. Smith gives the length of the queen as eleven lines.

Worker. Head.—Very elongate; with only dark pile. Malar space much longer than its width at apex, about two-fifths as long as eye. Clypeus rather coarsely, but not very densely, punctate. Third antennal segment nearly as long as fourth and fifth together, the fifth slightly longer than the fourth.

Thorax.—Entirely dark; the very center of the dorsal disc naked, smooth and shining.

Abdomen.—Dorsum: segment one clothed with black pile; segments two to five, inclusive, all covered with ferruginous-red pile; segment six dark. Venter mostly dark.

Wings.—Rather strongly infuscate.

Legs.—Coxæ, trochanters, femora and tibiae all dark and with black pile. Metatarsi with fringes short.

Male. Head.—Shaped and colored much like that of worker, but narrower and tapering more rapidly toward bases of mandibles. Mandibles with a rather heavy ferruginous beard. Malar space very much longer than its width at apex, about two-fifths as long as eye. Clypeus rather coarsely, but not densely, punctate; sparsely punctate in middle of distal end.

Thorax.—Dark, as in worker, but the pile finer than in that caste.

Abdomen.—Dorsum: segment one dark; the remaining segments clothed with rather pale ferruginous pile. Venter mostly dark, but the apical fringes of the segments rather pale.

Genitalia.—Outer spatha much like that of *dolichocephalus* (fig. 148). Inner spatha like that of *fervidus* (fig. 101). Claspers long, but apparently powerful (fig. 168 and fig. 189), in general much like those of the other members of the *Dumoucheli* group; branches, as seen from dorsal side, very broad and quadrate at apex; squamæ with inner lobe rounded at end and extending mesad far beyond inner margin of volsella, the outer lobe very broad and pointed at the apex on the side toward the middle line of the body; volsellæ very broad, with sides nearly parallel throughout and with very large, prominent and curved apical projections, the margins of these projections being even and their apices sharply pointed. Sagittæ with shafts long and curved outward somewhat in the middle, there being a prominent projection on the middle of the ventral side of each; the heads short and foliaceous and curved ventrad and laterad from the shaft. Uncus, except toward the base, narrow and tapering gradually to the very narrow and recurved apex.

Wings.—Light, somewhat infuscate.

Legs.—Dark like those of worker. Outer faces of hind tibiæ nearly flat and naked; their front and hind fringes long, forming distinct corbiculæ. Hind metatarsi with no long fringes, their outer faces distinctly concaved and bearing pubescence of two different lengths intermixed, the longer hairs being sparse.

Dimensions.—Length: queen, about 23 mm.; worker, 16 mm. to 17 mm.; male, 15 mm. Spread of wings: worker, 38 mm.; male, 37 mm. Width of abdomen at second segment: worker, about 7 mm.; male, about 7 mm.

Habitat.—It seems certain that Fabricius' early record of this species from "North America" was incorrect. It does not seem to be a very common species anywhere and, if present in Central America, it must be very rare there. Prof. Cockerell has given us an uncertain record of it from Rio Nautla, Mexico. At all events, it is mainly a South American form, and we have the following apparently certain records for it: Colombia, Venezuela, Peru (Pozuzo). It must also be present in Ecuador.

This species seems to have its closest allies in *dahlbomii*, *kohli* and *dolichocephalus*.

Bombus (Bombus) dahlbomii Guér.

Bombus Dahlbomii Guérin, Iconogr. Règn. Anim., VII, Insect., 1835, p. 459, n. 1; T. 75, F. 3, ♀ ☿.

" *nigripes* Haliday, Trans. Linn. Soc. Lond., XVII, 1836, p. 321, n. 21, ♀ ☿.

Bombus grandis Westwood, Duncan: Nat. Hist. of Bees, XXXVIII, 1840, p. 256; T. 17, F. 2.
" *Chilensis* Spinola, Gay: Hist. fis. Chile. Zoöl., VI, 1851, p. 165, n. 1.
" *Dahlbomii* Smith, Cat. Hym. Brit. Mus., II, 1854, p. 401, n. 64.
" *Chilensis* Philippi, Anal. Univ. St. Jago, XXI, 1862, p. 413.
" *Dahlbomii* Sichel, Reise d. Novara., Zoöl., II, P. I, 1867, Hym., p. 156.
" " Cunningham, Nat. Hist. Str. Mag., 1871, pp. 175 and 479.
" " Weijenbergh, Napp.: Republ. Argent., 1876, p. 163.
" " Holmberg, Anal. Soc. Cient. Argent., VIII, 1879, p. 161, n. 4, ♀ ☿.
" *Chilensis* Radoszkowski, Bull. Soc. Natural. Moscou, LIX, 1884, p. 79; T. 3, F. 28, ♂.
" *Dahlbomii* Ant. Handlirsch, Ann. naturh. Hofmus. Wien., III, 1888, p. 236, ♀ ☿ ♂; T. 10, F. 7.
" " Dalla Torre, Cat. Hym., X, 1896, p. 515.

Pile long, dense and rather fine. Malar space long. Head (except occiput), legs, the lower portion of the pleura (almost always in the queen, usually in the worker and often in the male), venter and last dorsal abdominal segment (of queen and worker—not so the male) black; the rest of the body clothed with ferruginous red pile.

Queen. Head.—Elongated. Occiput with a triangular patch of ferruginous-red pile, with at most only a very slight admixture of dark hair; remainder of head entirely dark. Malar space distinctly longer than its width at apex, fully one-third as long as eye. Clypeus, for most part, strongly punctate. Third antennal segment much longer than the fifth, the fifth somewhat longer than the fourth.

Thorax.—Dorsum clothed with ferruginous-red pile; upper portion of mesopleura ferruginous-red, the ferruginous pile reaching down at least half-way from the level of the bases of the wings toward the bases of the legs, the lower portion clothed with black pile; upper end of metapleura clothed with ferruginous-red pile; sides of median segment with at least an admixture of ferruginous hairs.

Abdomen.—Dorsum: first five segments clothed with ferruginous-red pile; epipygium black and with a very distinct longitudinal median carina on its apical portion. Venter dark; hypopygium without a median carina.

Wings.—Light brown, only moderately infuscate; about as in *ephippiatus.*

Legs.—Coxæ, trochanters, femora and tibiæ all dark and with dark clothing.

Worker.—Like the queen; smaller specimens with no distinct me-

dian carina on epipygium. Some specimens with ferruginous pile on pleura extending much more than half-way down from level of bases of wings toward bases of legs.

Male. Head.—Elongated. Coloration of pile like that of queen and worker. Malar space much longer than its width at apex, about one-third as long as eye. Clypeus, for most part, densely covered with black pile. Third antennal segment shorter than the fourth, the fourth shorter than the fifth.

Thorax.—Coloration of pile as in queen and worker, but the ferruginous color on the mesopleura sometimes reaching the bases of the legs; sides of median segment often with ferruginous pile only.

Abdomen.—Dorsum: first five segments always covered with ferruginous-red pile; segment six very often entirely ferruginous, but usually with some black hair near its apical margin, at least in the middle; segment seven very often clothed entirely with ferruginous pile, but usually with a more or less strong admixture of black hairs, especially toward the middle of its apical portion. Venter dark.

Genitalia.—Outer spatha (fig. 174) short and very broad, with front margin very deeply incurved; side margins also deeply incurved, so as to form long anterior-lateral projections; hind margin broadly outcurved in the middle, but slightly incurved on the sides. Inner spatha with two small median fenestræ, in the specimen before me, otherwise much like that of *fervidus* (fig. 101), but with the posterior corners of its apical portion rounded. Claspers (fig. 147 and fig. 170) long, but thick and powerful in appearance; branches with inner sides of their distal ends, as seen from dorsal side, sharply angled; squamæ much like those of *fervidus* and *pennsylvanicus;* volsellæ more or less grooved longitudinally with a single groove (not always very definite) not far removed from each side margin, as seen from the ventral side, their apical projections large, triangular and prominent and usually bearing several small, though noticeable, denticles (these, however, are sometimes almost entirely absent) on their hind margins. Sagittæ with shafts long and bent outward somewhat in the middle; their heads very short, considerably foliaceous and turned ventrad, with a large, prominent, recurved tooth on the outer side of each. Uncus, except toward the base, very narrow and tapering slowly toward the recurved apex.

Wings.—Light, at most only moderately infuscate and sometimes almost clear transparent.

Legs.—Coxæ, trochanters, femora and tibiæ all clothed with black pile. Outer faces of hind tibiæ slightly convex and naked, their fore and hind fringes long, forming good corbiculæ. Hind metatarsi with no long hind fringes, their outer faces strongly concaved.

Dimensions.—Length: queen, 25 mm. to 30 mm. (From Guérin's description, I judge they are sometimes somewhat longer than this. He described the largest as measuring 32 mm.); worker, 12 mm. to 18

mm.; male, 14 mm. to 17 mm. Spread of wings: queen, 50 mm. to 54 mm.; worker, 33 mm. to 45 mm.; male, 37 mm. to 42 mm. Width of abdomen at second segment: queen, 11 mm. to 13 mm.; worker, 6 mm. to 9 mm.; male, 7 mm. to 8½ mm.

The species is here redescribed from seven queens, six workers and six males.

Habitat.—We have the following records of capture of this species: Chile (Santiago, Punta Arenas and Borja Bay at the Straits of Magellan); Argentina (Chubut in Patagonia); Brazil (Santos, Rio de Janeiro, San Pablo and Sao Paulo). I have myself seen specimens from all the localities mentioned in Chile and Argentina. Cunningham (vide supra) states that the species is common at the Straits of Magellan.

This species is a very striking one on account of its color and size. It is easily the largest *Bombus* species in the Western Hemisphere. It is apparently quite constant in all its characters except that, in different specimens, the reddish pile varies in shade from a deep orange-ferruginous to a pale yellowish-ferruginous. It is probable that the deep orange-ferruginous is the normal color for the species and that specimens with the pale pile are faded.

This species has its closest relative in *dolichocephalus* as is shown by the structure of the genitalia of the male. *Kohli* also seems allied.

Bombus (Bombus) solus new species.

Type.—Described from a single male, deposited in the collection of the United States National Museum.

Entirely black. Malar space of medium length. Pile rather short and fine. Third antennal segment slightly longer than the fourth.

Queen and worker.—Unknown.

Male. Head.—Face with an inconspicuous admixture of short, pale pubescence with the black pile; occiput and ventro-lateral portions dark. Malar space about as long as its width at apex, about one-fifth as long as eye. Clypeus densely punctate, especially toward sides, and thinly hairy. Third antennal segment distinctly, but not greatly, longer than the fourth; the fifth somewhat shorter than the third and fourth together.

Thorax.—With dark pile.

Abdomen.—With dark pile.

Wings.—Very dark, with violaceous reflections.

Legs.—Black and with dark pile.

Dimensions.—Length, 16 mm.; spread of wings, about 40 mm.; width of abdomen at second segment, about 7½ mm.

Habitat.—Bonito, Pernambuco Province, Brazil.

This is the male of one of four apparently distinct black forms present in South or Central America. I should have taken it for the male of *kohli* had not Handlirsch already described a male, which is unknown to me, for that species, from abundant material. It is possible that Handlirsch really erred in his association of the sexes of *kohli*. It is also possible that the male here described is a melanic specimen of some species already known and does not represent a valid new species, though all the true melanic bumble-bees, which I have seen, have had some trace of the true coloration of the species to which they belonged, by means of which their true identity could be easily discovered.

Bombus (Bombus) atratus new species.

Bombus violaceus Holmberg, Anal. Soc. Cient. Argent., VIII, 1879, p. 156, n. 1, ♂.

" *cayennensis* var. *violaceus* Ant. Handlirsch, Ann. naturh. Hofmus. Wien., III, 1888, p. 241, ♂ (pars.); T. 10, F. 1.

Types.—Described from two males, one from Chiriqui and the other from San Bernardino, Paraguay. Both are deposited in the collection of the United States National Museum.

A black species, with wings dark and having slight violaceous reflections. Malar space somewhat shorter than its width at apex, nearly one-fourth as long as eye. Third antennal segment about three-fourths as long as the fourth, the fifth considerably longer than the fourth. Genitalia with heads of sagittæ reaching posteriorly somewhat father than tips of squamæ and nearly as far as distal ends of volsellæ. Distal ends of volsellæ very broad and not reaching far beyond tips of squamæ.

Females.—Niger may represent the females of this species.

Male. Head.—Face and occiput entirely dark or with the shorter pile whitish, giving the general effect of very dark cinereous. Ventrolateral portions entirely dark. Malar space somewhat shorter than its width at apex, nearly one-fourth as long as eye. Clypeus mostly

covered up with pile. Third antennal segment about three-fourths as long as fourth, the fifth considerably longer than the fourth.

Thorax.—Entirely black; a noticeable naked area present on the center of the disk.

Abdomen.—Entirely dark.

Genitalia.—Outer spatha much like that of *sonorus* (fig. 32). Inner spatha much like that of *pennsylvanicus* (fig. 132). Branches (figs. 161 and 167) rather sharply rounded on inner sides of distal ends as seen from dorsal side. Volsellæ with distal ends very broad and not extending far beyond tips of squamæ; apical projections triangular, the free angles of these projections being acute angles. Squamæ shaped somewhat like those of *pennsylvanicus* (fig. 66), but with outer lobe narrower and rather pointed at apex and with indentation between this lobe and the inner one deeper. Sagittæ with shafts slightly bent outward in the middle and with heads shaped much like those of *pullatus* and *medius*, their outer margins being distinctly, though not very deeply, serrate; much longer and larger, in comparison with the claspers, than those of *pullatus* or *medius*, extending somewhat beyond the tips of the squamæ and almost as far back as the tips of the volsellæ. Claspers appearing much thicker, in proportion to their length, than in *pullatus* or *medius*.

Wings.—Dark and with violaceous reflections.

Legs.—Some or all of the coxæ and trochanters with a scattering of dirty whitish hairs, though mostly dark; femora and tibiæ black; hind tibiæ with outer faces convex and hairy throughout, with no long fringes and without a trace of corbiculæ; hind metatarsi with outer faces distinctly concaved and with no long fringes.

Dimensions.—Length, 12½ mm. to 15 mm.; spread of wings, 33 mm. to 39 mm.

This species is apparently most closely related to *medius* and *pullatus*, but it may be readily separated from those species by means of the differences in the genitalia already noted.

This may be the true male of *kohli*.

Bombus (Bombus) brevivillus new species.

This species has the same doubtful bibliography as that given to *niger*.

Type.—Described from a single queen from Pernambuco, Brazil, deposited in the collection of the United States National Museum.

Pile short and coarse. Entirely black. Malar space of a little more than average length.

Wings.—Very dark, with violaceous reflections.

Queen. Head.—Rather elongate. Entirely black. Malar space somewhat shorter than its width at apex, about one-fourth as long as eye. Clypeus moderately punctate, with rather coarse punctures. Third antennal segment longer than fifth and fifth longer than fourth.

Thorax.—Entirely black. A noticeable, naked, smooth, shining area on center of disc.

Abdomen.—Entirely black. Hypopygium without a median carina. Epipygium with a slight longitudinal median carina on its very apical portion.

Wings.—Very dark and with strong violaceous reflections.

Legs.—Black.

Worker.—Unknown.

Male.—I think it possible that *pullatus* is the male of this species. See discussion following description of *niger*.

Dimensions.—Length, about 24 mm.; spread of wings, about 53 mm.

This species is most closely related to *mexicanus*, and I do not feel certain that there is not a complete gradation between them. I have not succeeded in separating them structurally. I can distinguish *brevivillus* from *niger* only by its shorter and coarser pile. Both *brevivillus* and *niger* may be readily separated from *kohli* by the distinctly longer malar space of the latter.

Bombus (Bombus) niger new species.

? *Bombus velutinus* Illiger, Magaz. f. Insectenk., V, 1806, p. 175, n. 63.
? " *violaceus* Lepeletier, Hist. Nat. Insect. Hymén., I, 1836, p. 473, n. 24, ♀ ☿.
? " " Smith, Cat. Hym. Brit. Mus., II, 1854, p. 400, n. 61.
? " " Greene, Ann. Lyc. Nat. Hist. New York, VII, 1860, p. 174, n. 13, ♀.
? " " Cresson, Proc. Ent. Soc. Phila., II, 1863, p. 108, n. 44, ♀ ☿.
? " " Holmberg, Anal. Soc. Cient. Argent., VIII, 1879, p. 156, n. 1, ♀ ☿ ♂.
? " *cayennensis* var. *violaceus* Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 241, ♀ ☿ ♂ (pars).
? " *violaceus* Hudson, Nat. in La Plata, 1892, p. 154.
? " *cayennensis* var. *violaceus* Dalla Torre, Cat. Hym., X, 1896, p. 514 (pars).
? " *violaceus* Dalla Torre, Cat. Hym., X, 1896, p. 563.

Types.—Described from four queen and four worker cotypes. Of these specimens, three queens and two workers are deposited in the collection of the United States National Museum and one queen and two workers in the collection of the Massachusetts Agricultural College. The places of capture of the queens were as follows: Colombia and Chiriqui (Boquete and Bogona). The workers came from the following places: Brazil (Pernambuco), Peru (Callanga), Chiriqui and Costa Rica (Carillo).

St. Fargeau's specimens are lost, so it is impossible to tell whether his *violaceus* was this species or *kohli* or *brevivillus*.

Pile of medium length and texture. Entirely black. Malar space of a little more than average length Wings dark, with violaceous reflections.

Queen. Head.—Rather elongate. Entirely dark. Malar space somewhat shorter than its width at apex, about one-fourth as long as eye. Clypeus sparsely punctate, with rather coarse punctures and with numerous fine punctures also present. Third antennal segment longer than fifth, the fifth longer than the fourth.

Thorax.—Entirely black. A rather large naked area on middle of dorsal disc, a considerable portion of this area being smooth and shining.

Abdomen.—Entirely black. Hypopygium without a medium carina.

Wings.—Very dark and with strong violaceous reflections.

Legs.—Black.

Worker.—Like the queen.

Male.—The queen and worker of this species are apparently less closely related to *mexicanus* than is the queen of *brevivillus*, and *atratus* appears less closely related to *mexicanus* than is *pullatus*. These facts suggest that *pullatus* may be the male of *brevivillus*, while *atratus* is possibly the male of *niger*.

Dimensions.—Length: queen, 20 mm. to 24 mm.; worker, 11½ mm. to 17 mm. Spread of wings: queen, 48 mm. to 52 mm.; worker, 29 mm. to 42 mm.

Habitat.—British Honduras (Belize); Costa Rica (Carillo and La Estrella de Cartago); Chiriqui (Bogona and Boquete); Colombia; Venezuela (San Julian); Ecuador; Peru (Callanga); Brazil (Bonito in the Province of Pernambuco and St. Catharina) and Paraguay (Sapucay).

This species is apparently most closely related to *medius*, *mexicanus* and *brevivillus*. I have been able to separate it

from the last of these three species only by the different length and texture of its pile.

Bombus (Bombus) pullatus new species.

? *Bombus violaceus* Holmberg, Anal. Soc. Cient. Argent., VIII, 1879, p. 156, n. 1, ♂.

? " *cayennensis* var. *violaceus* Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 241, ♂ (pars).

Type.—Described from a single male from Ecuador, deposited in the collection of the United States National Museum.

Face with dark cinereous pile; body otherwise almost entirely black. Malar space somewhat shorter than its width at apex. Third antennal segment distinctly shorter than the fourth; the fifth much longer than the fourth. Wings dark and with distinct violaceous reflections. Genitalia with sagittæ not reaching quite as far back as the tips of the squamæ; the volsellæ reaching far beyond the heads of the sagittæ; the sagittæ with nearly straight shafts.

Queen.—*Brevivillus* may be the queen of this species.

Worker.—Unknown.

Male. Head.—Face clothed with very dark cinereous pile (this pile is made up of long dark brown hair and shorter dirty whitish pile or down). Occiput dark. Ventro-lateral portions bearing brown pile. Malar space somewhat shorter than its width at apex, nearly one-fourth as long as eye. Clypeus, for most part, covered up with very dark cinereous pile. Third antennal segment distinctly shorter than fourth, the fifth much longer than the fourth.

Thorax.—Clothed with entirely dark brown pile; a large area on dorsal disc and all but hind and side margins of scutellum naked, the pile apparently having been rubbed off.

Abdomen.—Entirely dark.

Genitalia (figs. 159 and 166).—Much like those of *medius* (see the comparison of the genitalia of these two species, following the description of *medius*). Sagittæ with nearly straight shafts and with outer margins of heads nearly entire, scarcely serrate at all; their heads extending posteriorly but little beyond the long inner lobes of the squamæ, these lobes reaching mesad far past the rounded projections on the inner sides of the volsellæ to nearly even with the outer margins of the heads of the sagittæ. Tips of volsellæ reaching considerably beyond tips of squamæ.

Wings.—Dark and with distinct violaceous reflections.

Legs.—Coxæ and trochanters with scattering dirty whitish pile, though mostly dark. Femora and tibiæ black. Hind tibiæ with outer faces convex and hairy throughout; with no long fringes and no trace

of corbiculæ. Hind metatarsi with outer faces distinctly concaved; with no long fringes.

Dimensions.—Length, about 19 mm.; spread of wings, about 38 mm.

This species is most closely related to *medius*, but appears to be distinct from it. *B. atratus* is certainly quite distinct from both and is possibly the male of *niger*. *Incarum* is also quite distinct from all these forms. *Mexicanus* is certainly distinct from *pullatus*. The volsellæ of the genitalia of *pullatus* have much wider apices and more hook-like apical projections than do those of *mexicanus*, and the squamæ of *pullatus* have the outer lobe well developed and prominent while those of *mexicanus* do not.

Bombus (Bombus) medius Cress.

Apis cajennensis Fabricius, Suppl. Ent. Syst., 1798, p. 273, n. 13–14.
Bombus cajennensis Fabricius, Syst. Piez., 1804, p. 345, n. 13.
? " " Illiger, Magaz. f. Insectenk., V, 1806, p. 172.
? *Bremus* " Jurine, Nouv. méth. class. Hym., 1807, p. 259, ♀.
? *Bombus* " Lepeletier, Hist. Nat. Insect. Hymén., I, 1836, p. 471, n. 20, ♀ ☿ ♂.
? " " Spinola, Mem. Accad. Sc. Torino, (2), XIII, 1853, p. 92, n. 73.
? " *cayennensis* Smith, Cat. Hym. Brit. Mus., II, 1854, p. 401, n. 63.
" *medius* Cresson, Proc. Ent. Soc. Phila., II, 1863, p. 97, n. 17, ☿.
? " *cayennensis* Holmberg, Anal. Soc. Cient. Argent., VIII, 1879, p. 160, n. 3, ♀ ☿ ♂.
? " *unifasciatus* Smith, Descr. New Spec. Hym., 1879, p. 133, n. 8, ♀ ☿ ♂.
" *medius* Cresson, Trans. Amer. Ent. Soc., VII, 1879, p. 230 (Catal.).
? " *cayennensis* Ant. Handlirsch, Ann. naturh. Hofmus. Wien., III, 1888, p. 240, ♀ ☿ ♂—var. a.
? " " var. *Mexicanus* Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 241, ♀ ☿.
? " " Dalla Torre, Cat. Hym., X, 1896, p. 513.
" *medius* Dalla Torre, Cat. Hym., X, 1896, p. 533.
? " *cayennensis* Cockerell, Cat. Abej. de Mexico, 1899, p. 19 (Catal.).
" *medius* Cockerell, Psyche, XII, 1905, p. 90.

Types.—It is, of course, doubtful whether Fabricius' speci-

mens of *cayennensis* are still extant and, without his type, it is absolutely impossible to tell whether he had *incarum* or this species. His specimen came from Cayenne. I have not seen Cresson's type of *medius*. It is probably in the collection of the United States National Museum. I have, however, seen specimens labelled "*medius*" by Cresson, in the collection of the American Entomological Society, and those specimens were specimens of this species. The type locality (Utah), given for *medius* by Cresson, is certainly incorrect. Among all the specimens, which I have seen from the western United States, there was not one which could have belonged to this species, and Prof. Cockerell states (Psyche, XII) that this species is not present in the western States, but is Mexican. Col. C. T. Bingham failed to locate Smith's type specimens of *unifasciatus* in the collection of the British Museum for me, and it is impossible to tell from Smith's description whether his specimens belonged to *medius* or *mexicanus*. They came from Guatemala (at 5,000 feet altitude), Costa Rica (Irazu at 6,000–7,000 feet altitude) and "San Francisco" at 4,500 feet altitude.

Pile rather short and coarse and considerably variable in coloration The typical form has the dorsum of the thorax yellow, with a broad black interalar band, and the third dorsal abdominal segment yellow, but is otherwise entirely dark in the females and also mostly so in the males, except for some light pile on the face and some ferruginous pile on the very apex of the abdomen. This typical form grades completely into a form which, aside from the third dorsal abdominal segment, is entirely black in the female caste and also mostly black in the male, except for the ferruginous pile on the hypopygium and epipygium. Abdomen of female rarely entirely black. Malar space of females shorter than its width at apex, a little more than one-fifth as long as eye. Genitalia with outer lobe of squamæ well developed and rather pointed at tip.

Queen. Head.—Entirely dark. Malar space distinctly shorter than its width at apex, a little more than one-fifth as long as eye. Clypeus moderately punctate, with mostly rather coarse punctures, the front part of the disc, however, with the punctures sparse. Third antennal segment longer than fifth, the fifth longer than the fourth.

Thorax.—Dorsum yellow in front and on scutellum, with a very broad black band between bases of wings (this band is distinctly more than half as wide, from front margin to rear margin, as it is long, from wing base to wing base). Yellow pile extending down, from

front part of dorsum, to somewhat below level of bases of wings; mesopleura otherwise entirely dark. Metapleura and sides of median segment entirely dark.

Abdomen.—All black, except third dorsal segment. This segment clothed, for most part, with yellow pile, but its very basal portion usually with yellow replaced somewhat by very short black hairs.

Wings.—Dark and usually with strong violaceous reflections.

Legs.—Entirely dark. Hind margin of posterior metatarsi usually rather suddenly arcuate near the base, but nearly straight throughout the greater part of its length.

Worker.—Like queen, but with malar space but little, if any, more than one-fifth as long as eye. Short black hair usually not showing on basal portion of third dorsal abdominal segment. Black interalar band sometimes not more than half as wide, from front margin to rear margin, as long, from wing base to wing base.

Male. Head.—Face clothed with mostly cinereous pile (this pile is made up of a mixture of long dark hairs and shorter whitish pile or down), this clothing being darkest above the bases of the antennæ and lightest over the clypeus. Occiput either bearing a mixture of dark and yellow hairs or with a triangular patch of pure yellow pile, this patch being extended, on each side, along the hind margin of the head, down onto the sides somewhat, behind the upper ends of the eyes. Ventro-lateral portions with a slight sprinkling of yellow hairs. Malar space somewhat shorter than its width at apex, about one-fifth as long as eye. Clypeus mostly covered up with dirty whitish pile, there being only a scattering of dark hairs admixed. Third antennal segment distinctly shorter than fourth, the fifth much longer than the fourth.

Thorax.—Coloration of pile much like that of females, but with the yellow pile sometimes reaching down, from the front part of the dorsum, on the mesopleura, as much as half the distance from the bases of the wings to the bases of the legs. Each side of metanotum bearing a tuft of yellow pile just behind the base of the hind wing. Interalar band about half as wide as long.

Abdomen.—Dorsum; segments one and two entirely black; segment three clothed entirely with yellow; segment four with basal portion covered with yellow and apical portion with black pile; segments five and six entirely black; segment seven with some short black hairs on basal portion and on middle of apical portion, but otherwise clothed with ferruginous pile. Venter mostly dark, but the apical margins of most of the segments fringed with pale ferruginous pile, the apical fringe of the hypopygium being rather strongly ferruginous.

Genitalia (figs. 162 and 163).—Much like those of *mexicanus* (figs. 160 and 164), but with apices of branches distinctly angled on their inner sides, as viewed from above; outer margin of head of sagitta distinctly serrate; outer lobe of squama well developed and rather pointed at apex.

Wings.—Strongly infuscate, but much lighter than those of queen and considerably lighter than those of most workers; with practically no violaceous reflections.

Legs.—Mostly dark; the trochanters and coxæ and the very lowest portions of the meso- and metapleura with a strong sprinkling of dirty whitish hairs. Hind tibiæ with outer faces convex and hairy throughout, with no long fringes and no trace of corbiculæ. Hind metatarsi with outer faces distinctly concaved and with no long fringes.

Dimensions.—Length: queen, 20 mm. to 21 mm.; worker, 10 mm. to 17 mm.; male, nearly 14 mm. Spread of wings: queen, 42 mm. to 47 mm.; worker, 28 mm. to 37 mm.; male, 33 mm. to 34 mm.

The species is here described from six queens, numerous workers and two males. The typical species, above described, grades completely into the following forms, specimens of which are before me:

Color Variant 1.—Worker like typical form, but with scutellum and front part of dorsum of thorax bearing only a little yellow pile, this being thoroughly mixed with black hairs. About 12 mm. long. A single worker from Chiriqui.

Color Variant 2.—Queen like typical form, but with scutellum entirely black; with only a little yellow pile on the front part of the dorsum of the thorax, this having a slight admixture of black hairs. About 18 mm. in length. A single specimen from Brazil (Sao Paulo).

Color Variant 3.—Worker like typical form, but with thorax entirely black—thus completely paralleling *mexicanus* in coloration. About 12 mm. in length. A single specimen from Chiriqui.

Color Variant 4.—Like Color Variant 3, but with yellow pile on third dorsal abdominal segment confined to posterior portion of that segment and not reaching its side margins. About 15 mm. in length. A single worker from Paraguay (Sapucay).

Color Variant 5.—Worker like typical worker, but with abdomen entirely black. Length about 12 mm. A single specimen from Paraguay (Sapucay).

Male Color Variant 1.—Like typical male, but with interalar band slightly more than half as wide, from front margin to rear margin, as long, from wing base to wing base, and with second, third and fourth dorsal abdominal segments entirely covered with yellow pile and with epipygium clothed with entirely ferruginous pile. Hind femora with scattering of yellow hairs on lower side of middle portion. Ventro-lateral portions of head bearing a mixture of dark and yellow hairs. Length about 19 mm. A single specimen from Boquete, Chiriqui (3,500 feet altitude).

Male Color Variant 2.—Like typical male, but with ventro-lateral portions of head entirely dark and with yellow pile on front part of

dorsum of thorax and on scutellum with a slight admixture of black hairs and not extending down on the sides, in front, to much below the level of the bases of the wings; black interalar band distinctly more than half as wide as long, the tegulæ scarcely dipping at all into the yellow pile in front; metanotum bearing no yellow pile; dorsum of abdomen with third and fourth segments entirely covered with yellow pile; sixth segment having an admixture of ferruginous hairs, this admixture being very slight on the middle of the segment, but very strong on the extreme sides; seventh segment clothed with entirely ferruginous pile. Length about 15 mm. A single specimen from Boquete, Chiriqui (3,500 feet altitude).

Male Color Variant 3.—Like Male Color Variant 2, but with only a faint sprinkling of yellow hairs on the middle of the front part of the dorsum of the thorax and on the scutellum; face with very dark cinereous pile throughout; occiput entirely dark; epipygium clothed like that of typical male. Length about 16 mm. Two specimens from Ecuador.

Male Color Variant 4.—Like Male Color Variant 3, but with face having cinereous pile about as in typical male and with thorax entirely black. Length about 13 mm. A single specimen from Ecuador.

Male Color Variant 5.—Like Male Color Variant 4, but with head entirely dark; third dorsal abdominal segment clothed mostly with yellow pile, but with the yellow hair replaced by a thin clothing of short black pile on its very basal portion; fourth dorsal segment bearing black pile on its apical portion, this being bordered in front by a narrow line of yellow hairs, the very basal portion of the segment being thinly clothed with short black hairs as in the case of the third segment; epipygium clothed with entirely ferruginous pile; venter almost entirely dark, except hypopygium, this being fringed apically with rather strongly ferruginous pile. Length about 16 mm. A single specimen from Ecuador.

Habitat.—Mexico (Orizaba, one male; Rio Nautla, one worker; Otoyac, one worker; Coatepec, one worker); Guatemala (Department of Solola, Olas de Moka, one male, three workers and four queens); Chiriqui (Boquete, two workers and two males); Ecuador (seven workers); Brazil (Minas Geraes, one worker; Sao Paulo, one queen); Paraguay (Sapca y, one queen and five workers); Mexico (one queen).

There seems to be a slight variation in the length of the malar space of the queen.

This species seems to have its nearest ally in *mexicanus*. The females may be separated from those of *mexicanus* by

their somewhat shorter malar space and by the hind margin of their posterior metatarsi rather more suddenly arcuate near the base. The males may be separated from those of *mexicanus* by the differences in the structure of their genitalia, particularly of the squamæ, and by the ferruginous pile on their last dorsal abdominal segment. The genitalia of *medius* may be separated from those of *pullatus* by the somewhat narrower apices of their volsellæ, with their somewhat less hood-like apical projections, and by the distinctly serrate outer margins of the heads of their sagittæ.

Pullatus, *medius* and *mexicanus* all agree in having the tips of the volsellæ of their genitalia extend considerably beyond the squamæ and far beyond the heads of the sagittæ. In this respect, these species all differ markedly from *atratus*.

The yellow pile on the specimens of *medius* before me varies from pale straw color to a good deep yellow.

It seems possible that *medius* may even grade into a completely black form, and I do not feel certain that *niger*, which seems very closely related, is not, in reality, such a gradation of this species.

Bombus (Bombus) mexicanus Cress.

Bombus mexicanus Cresson, Proc. Acad. Nat. Sc. Phila., 1878, p. 187, ♀ ☿.

? " *unifasciatus* Smith, Descr. New Spec. Hym., 1879, p. 133, n. 8, ♀ ☿ ♂.

" *mexicanus* Cresson, Trans. Amer. Ent. Soc., VII, 1879, p. 231 (Catal.).

? " *Cayennensis* var. *Mexicanus* Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 241, ♀ ☿.

" sp. Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., VI, 1891, p. 453, ♂, and perhaps the ☿.

" *mexicanus* Dalla Torre, Cat. Hym., X, 1896, p. 534.

" " Cockerell, Cat. Abej. de Mexico, 1899, p. 19 (Catal.).

Types.—Some, at least, of the specimens, from which Cresson made his original description of this species, are in the collection of the American Entomological Society. They came from Mexico. Col. C. T. Bingham failed to locate Smith's type specimens of *unifasciatus*, in the collection of the British Museum, for me.

Pile short and coarse. Females entirely, and males mostly, black, except third dorsal abdominal segment, this being covered with yellow pile. Malar space of females somewhat shorter than its width at apex, nearly one-fourth as long as eye. Squamæ of genitalia with outer lobe very short almost wanting.

Queen. Head.—Entirely dark. Malar space somewhat shorter than its width at apex, nearly one-fourth as long as eye. Clypeus moderately punctate, with rather coarse and very fine punctures mixed, rather sparsely so on front part of disc. Third antennal segment longer than fifth and fifth longer than fourth.

Thorax.—Entirely black. Center of dorsal disc with a considerable area naked.

Abdomen.—Entirely dark, except third dorsal segment; this segment clothed, for most part, with yellow pile, except on very basal portion, this portion being thinly clothed with very much shorter black hairs. Hypopygium without a median carina. Surface of epipygium elevated somewhat in middle of very apical portion.

Wings.—Very dark and with strong violaceous reflections.

Legs.—Entirely dark.

Worker.—Like queen, but with slightly lighter wings. Malar space apparently somewhat shorter, in proportion to length of eye, than that of queen..

Male. Head.—Mostly dark; face with mostly cinereous pile (this pile being darkest above the bases of the antennæ, there being a much more sparse admixture of the long dark hairs on the clypeus); occiput sometimes with a faint admixture of yellow pile. Malar space nearly as long as its width at apex, nearly one-fourth as long as eye. Clypeus mostly covered up with usually light cinereous pile. Third antennal segment slightly shorter than fourth, the fifth much longer than the fourth.

Thorax.—Entirely dark. Center of dorsal disc with a noticeable naked area.

Abdomen.—Dorsum: segments one and two entirely dark; segment three mostly yellow, sometimes with the yellow pile replaced, on the very basal portion, with very short black hairs; segment four either entirely covered with yellow pile or with yellow pile on the basal portion and the very apex bearing black pile; segments five, six and seven entirely dark. Venter mostly dark, but with apical fringe of last segment ferruginous and the fringes of some other segments tinged with the same color.

Genitalia.—Outer spatha like that of *sonorus* (fig. 32). Inner spatha like that of *pennsylvanicus* (fig. 132). Ends of branches (figs. 160 and 164) rounded, not angled, on their inner sides. Volsellæ with narrow apices, their apical projections triangular and blunt pointed; with a very prominent rounded projection on their inner sides, a little be-

hind the middle (this projection is common to most of the species of the *Dumoucheli* group known to me, but it is particularly prominent in *medius*, *pullatus* and this species. It is absent, or practically so, in *montezumæ*, *carolinus* and *dahlbomii*); extending considerably beyond tips of squamæ. Squamæ extending a little beyond heads of sagittæ; their outer lobe almost wanting, being very short and broadly rounded, but the inner lobe well developed and extending mesad considerably beyond the inner margin of the volsella. Shafts of sagittæ bent outward somewhat in the middle and the outer margins of their heads entire or nearly so, not distinctly serrate. Uncus very broad in the middle, but tapering rapidly to the recurved apex.

Wings.—Generally somewhat lighter than those of workers and considerably lighter than those of queens, with only slight violaceous reflections.

Legs.—Mostly dark, though often with a considerable scattering of dirty whitish hairs about their bases. Hind tibiæ with outer faces convex and hairy throughout, without long fringes or trace of corbiculæ. Hind metatarsi with outer faces distinctly concaved, with no long fringes.

Dimensions.—Length: queen, 20 mm. to 24 mm.; worker, 11½ mm. to 15½ mm.; male, 13½ mm. to 15½ mm. Spread of wings: queen, 47 mm. to 51 mm.; worker, 29 mm. to 33 mm.; male, 32 mm. to 36 mm.

The species is here redescribed from five queens, numerous workers and four males.

Habitat.—Mexico; Guatemala (Department of Solola—Olas de Moka—seven workers); Costa Rica (San José, three workers); Chiriqui (Boquete, one worker; Bogona, one queen); Ecuador (four queens, one worker and four males).

This species is possibly most closely related to *brevivillus*, which has the same short, coarse pile in the queen caste and which may possibly grade into it. With this possible exception, *medius* is its closest ally. The females of *mexicanus* have a slightly longer malar space than do those of *medius*. The males of *mexicanus* apparently never have ferruginous pile on the last dorsal segment of the abdomen, while those of *medius* appear to always have it. See the discussion, following the description of *medius*, for other points of difference between the two species. Also see the discussion, following the description of *pullatus*, for points of difference between that species and *mexicanus*.

The yellow pile, on the specimens of this species before me, varies in shade from pale straw to a good deep yellow.

Bombus (Bombus) incarum new species.

? *Apis cajennensis* Fabricius, Suppl. Ent. Syst., 1798, p. 273, n. 13-14.
? *Bombus cajennensis* Fabricius, Syst. Piez., 1804, p. 345, n. 13.
? " " Illiger, Magaz. f. Insectenk., V, 1806, p. 172.
? *Bremus* " Jurine, Nouv. Méth. Class. Hym., 1807, p. 259, ♀.
? *Bombus* " Lepeletier, Hist. Nat. Insect. Hymén., I, 1836, p. 471, n. 20, ♀ ☿ ♂.
? " " Spinola, Mem. Accad. Sc. Torino (2), XIII, 1853, p. 92, n. 73.
? " " Smith, Cat. Hym. Brit. Mus., II, 1854, p. 401, n. 63.
? " " Holmberg, Anal. Soc. Cient. Argent., VIII, 1879, p. 160, n. 3, ♀ ☿ ♂.
? " " Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 240, ♀ ☿ ♂—pars, var. a.
? " " Dalla Torre, Cat. Hym., X, 1896, p. 513 (pars).
? " " Cockerell, Cat. Abej. de Mexico, 1899, p. 19 (Catal.).

Types.—Described from five queen cotypes (three of these from Chanchamayo, Peru, one from Callanga, Peru and one from Boquete, Chiriqui), of which four are deposited in the collection of the United States National Museum and one in the collection of the Massachusetts Agricultural College; from sixteen workers (fourteen from Chanchamayo, Peru and two from Callanga, Peru), of which fourteen are deposited in the collection of the United States National Museum and two in the collection of the Massachusetts Agricultural College; from one male, from Chanchamayo, Peru, deposited in the United States National Museum.

Pile coarse and rather short Dorsum of thorax yellow, with black band between bases of wings. Pleura mostly black. Abdomen with third dorsal segment yellow, otherwise black Legs black. Wings dark. Head of females black and of males mostly dark. Malar space long.

Queen. Head.—Rather elongate. Face entirely black. Occiput sometimes entirely black and sometimes with a triangle of nearly pure (not mixed with black) yellow pile, but usually dark with a faint admixture of yellowish hairs. Sides entirely dark. Malar space nearly as long as its width at apex, nearly one-third as long as eye. Clypeus, for most part, finely punctate, with scattering coarse punctures, but with a considerable area on middle of front portion smooth and shining. Third antennal segment longer than fifth, the fifth longer than the fourth.

Thorax.—Dorsum covered with yellow pile, except for black band between bases of wings (this band is scarcely half as wide from front to rear as it is long from wing base to wing base, and, in some cases, it is not well defined, there being a more or less strong admixture of yellow hairs with the black). Mesopleura with yellow pile extending down from front part of dorsum to some distance below level of bases of wings, but for most part clothed with black pile. Metapleura and sides or median segment entirely dark.

Abdomen.—Third dorsal segment clothed with yellow pile, otherwise entirely dark. Hypopygium without a median carina.

Wings.—Very dark, with strong violaceous reflections.

Legs.—Entirely black or brown. Hind margins of posterior metatarsi rather evenly arcuate from base to apex.

Worker.—Like the queen, but with somewhat lighter wings. Clypeus sparsely punctate, with mostly coarse punctures.

Male. Head.—Face, for most part, clothed with cinereous pile (this pile is a mixture of long dark brown hairs and shorter whitish pile or down). Occiput covered with a triangle of nearly pure yellow pile. Sides of head mostly dark. Malar space fully as long as its width at apex, nearly one-third as long as eye. Clypeus, except on middle of front portion, largely covered with cinereous pile. Third and fourth antennal segments subequal in length, the fifth longer than either.

Thorax.—Coloration of dorsum like that of queen and worker, but the black interalar band very poorly defined, there being a very strong admixture of yellow hairs with the black. Yellow on upper portions of mesopleura extending far below level of bases of wings; their lower portions, however, dark. Extreme end of metanotum bearing a tuft of yellow hair behind the base of each hind wing. Metapleura and sides of median segment dark.

Abdomen.—Dorsum : segment one entirely dark ; segment two dark, except for a small amount of yellow pile on each hind corner ; segment three clothed entirely with yellow pile ; segment four mostly dark, but with some yellow hair on basal margin, especially at sides ; segments five and six black. Venter black.

Genitalia (figs. 184 and 187).—Apices of branches, as seen from dorsal side, acute angled on side toward median plane of body. Volsellæ with apical projections much broader and more quadrangular than usual. Squamæ greatly elongated and somewhat curved, with tips blunt pointed, reaching considerably beyond tips of volsellæ, and curving around behind ends of sagittæ ; the inner lobe absent. Sagittæ with shafts distinctly bent outward in middle ; heads very elongate foliaceous and downward curved, with very tips narrowed and curved mesad somewhat and with outer margins almost entire, only very slightly serrate.

Wings.—Considerably lighter than those of queen, without noticeable violaceous reflections.

Legs.—Pile all dark. Hind tibiæ with outer faces convex and hairy throughout, though rather sparsely so toward distal ends; fore and hind fringes not very long and not forming corbiculæ. Hind metatarsi with outer faces distinctly concaved, without long fringes.

Dimensions.—Length: queen, 21 mm. to 25 mm.; worker, 12 mm. to 18 mm.; male, about 15 mm. Spread of wings: queen, 47 mm. to 49 mm.; worker, 30 mm. to 38 mm.; male, about 35 mm.

Habitat.—Peru (Callanga and Chanchamayo); Chiriqui (Boquete); British Guiana (Georgetown); Surinam; Paraguay (Sapucay); Brazil (Rio Grande do Sul).

This species is apparently related to *medius*, *niger*, *pullatus* and *atratus*. Most of the workers before me and the male have been immersed in some liquid, the pile being badly matted and the yellow being faded out to a pale straw color. The yellow of all specimens in good condition (including most of the queens and two of the workers) is a fairly deep rich yellow.

The queen and worker of this species may be separated from the females of *medius* by the difference in the arcuation of the hind margin of the posterior metatarsi. *Medius* has this margin more suddenly arcuate toward the base than does *incarum*, the latter species having it more nearly evenly arcuate from base to apex. Furthermore, the black interalar band of *medius* is more than half as wide, from front margin to rear margin, as it is long, from wing base to wing base, which is not the case with *incarum*. The male of *incarum* may be readily separated from all other males known to me by means of the greatly elongated squamæ of its genitalia.

Bombus (Bombus) sonomæ Howard.

Bombus sonomæ Howard, Insect Book, 1904, Plate 2, fig. 7, ♀.

Type.—The queen which Dr. Howard figured is the type of the species. I here describe the queen from eight specimens, seven of which, including the type, are deposited in the collection of the United States National Museum and one in the collection of the Massachusetts Agricultural College. The worker is described from six specimens (cotypes of this caste), of which one is deposited in the collection of the Massachusetts Agricultural College and five in the col-

lection of the United States National Museum. I describe the male from two specimens, deposited in the United States National Museum collection.

Pile of medium length and texture. Malar space rather long. Queen and worker with head and pleura dark, with dorsum of thorax yellow, except for black interalar band, and with dorsum of abdomen yellow, except last two segments, these being black. Males colored much like females, but with pleura mostly pale yellow; anal segment dark, the remainder of the dorsum of the abdomen being yellow

Queen. Head.—Elongate. Usually entirely black, but rarely with a faint admixture of yellow hairs above bases of antennæ. Malar space longer than its width at apex, between one-third and one-fourth as long as eye. Clypeus rather coarsely, but not densely, punctate. Third antennal segment much longer than fifth, the fifth longer than the fourth.

Thorax.—Dorsum: anterior part covered with yellow pile; yellow extending down onto anterior part of mesopleura to somewhat below level of bases of wings; a broad and well defined black band between bases of wings; scutellum clothed with yellow pile; very center of disc naked. Mesopleura, except upper anterior portion, clothed with black pile to bases of legs. Metapleura and sides of median segment entirely dark.

Abdomen.—Dorsum: segments one to four, inclusive, covered with yellow pile; segments five and six black; epipygium with a longitudinal median carina on its apical portion. Venter entirely dark; hypopygium without a distinct median carina.

Wings.—Strongly infuscate; about like those of *fervidus* queen.

Legs.—Coxæ, trochanters, femora and tibiæ all clothed with black pile.

Worker.—Like queen in most respects; face usually with a very slight admixture of yellow pile above bases of antennæ; yellow pile on front part of mesopleura sometimes reaching down as far as half way from level of bases of wings toward bases of legs; very upper ends of metapleura sometimes with a small patch of yellow pile immediately behind base of wing; wings, as a rule, considerably lighter than those of queen.

Male. Head.—Elongate. Face mostly dark, but with a noticeable admixture of pale yellow pile about bases of antennæ and on clypeus. Occiput sometimes entirely dark and sometimes with a noticeable admixture of yellow hairs. Ventro-lateral portions mostly dark, but with some pale hairs admixed. Malar space distinctly longer than its width at apex, between one-third and one-fourth as long as eye. Clypeus with central and front portions of its disc naked and, for most part, sparsely punctate, the remaining portions rather thinly clothed

with a mixture of dark and pale pile. Third antennal segment longer than fourth, but shorter than fifth.

Thorax.—Coloration of pile much like that of females, but the mesopleura covered with pale yellow pile to the bases of the legs; upper portion of metapleura and sides of median segment also with mostly whitish yellow pile.

Abdomen.—Dorsum: segments one to five, inclusive, covered with yellow pile; segment six either entirely clothed with yellow pile or with the very apical portion bearing black pile; segment seven black and with black pile, but sometimes with a slight admixture of yellow hairs toward the sides. Venter mostly dark, but with the lateral portions of the apical fringes of most of the segments whitish.

Genitalia.—Outer spatha very much like that of *B. pennsylvanicus* (fig. 126). Inner spatha much like that of *pennsylvanicus* (fig. 132), but without a fenestra in the specimen before me. Claspers short and powerful in appearance (fig. 156); the branches, as viewed dorsally, with their apices broadly rounded and rather quadrate in form; volsellæ with very large, prominent and triangular apical projections and with a large and prominent rounded protuberance on the inner side of each, somewhat beyond its middle. Squamæ strongly bilobed, the two lobes being of about equal size; outer lobe strongly pointed and reaching nearly as far as distal end of volsella; inner lobe rounded at apex and extending mesad far beyond inner margin of volsella. Sagittæ and uncus much like those of *fervidus* (fig. 102).

Wings.—Much lighter than those of queen, only slightly infuscate; about like those of the *fervidus* male.

Legs.—Coxæ all with considerable whitish pile; trochanters mostly dark, but sometimes with a few pale hairs; femora all with much pale hair, this color usually extending along their entire length, at least on one side; fore tibiæ dark: middle and hind tibiæ sometimes almost entirely dark, but often with a considerable ferruginous tinge to their short hairs; outer faces of hind tibiæ convex and rather evenly hairy, there being no trace of corbiculæ. Hind metatarsi with outer faces distinctly concaved and with no long fringes.

Dimensions.—Length: queen, 16 mm. to 18 mm.; worker, 10 mm. to 13 mm.; male, 12 mm. to 13 mm. Spread of wings: queen, 41 mm. to 45 mm.; worker, 24 mm. to 28 mm.; male, 27 mm. to 31 mm. Width of abdomen at second segment: queen, 8 mm. to 8½ mm.; worker, 5 mm. to 6 mm.; male, 5 mm. to 6 mm.

Habitat.—All the specimens of this species, seen by me, came from Mexico. One worker was from Eslava. Seven of the queens (including the type), four of the workers and the two males were collected by C. H. T. Townsend, in Meadow Valley, head of Rio Piedras Verdes (six miles south

of Colonia Garcia), Sierra Madre of western Chihuahua—about 7,000 feet altitude.

This species is a close ally of *fervidus* and may be a subspecies of that species. It may be distinguished from *fervidus* by the dark pleura of its females and by the sixth dorsal abdominal segment of its males either entirely or mostly covered with yellow pile. The yellow pile of *sonomæ* is of a distinctly darker and richer shade than that of *fervidus*, the yellow of *fervidus* usually being nearly a pale clay-yellow while that of *sonomæ* is usually light old gold. The outer lobe of the squamæ of the genitalia of the typical male of *sonomæ* is much more pointed than is that of the typical *fervidus* male, but with *fervidus* this seems to be a somewhat variable character.

Bombus (Bombus) brasiliensis Lepeletier.

Bombus brasiliensis Lepeletier, Hist. Nat. Insect. Hymén., I, 1836, p. 470, n. 8, ♀ ♂.
" *Brasiliensis* Smith, Cat. Hym. Brit. Mus., II, 1854, p. 401, n. 62.
" *venustus* Smith, Journ. of Ent., I, 1861, p. 154, n. 6, ♀.
" *Brasiliensis* Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 240, ♀ ♂ ☿.
" *brasiliensis* Dalla Torre, Cat. Hym., X, 1896, p. 512.
" " Strand, Zoöl. Jahrb., XXIX, 1910, p. 553.

Types.—Probably lost.

Pile of medium length and rather coarse. Malar space medium. Head of females entirely dark. Thorax yellow above and on pleura, with a broad black interalar band. Abdomen with first and third and basal middle and hind corners of second dorsal segment covered with yellow pile, the remaining portions usually being all dark. Legs and wings dark.

Queen. Head.—Rather elongate; sometimes entirely black, but the face often with a very faint sprinkling of short whitish pile about the bases of the antennæ. Malar space very nearly as long as its width at apex, about one-fourth as long as eye. Clypeus moderately punctate. Third antennal segment longer than fifth, the fifth longer than the fourth.

Thorax.—Dorsum yellow, but with a very broad black band between bases of wings (this band is sometimes not more than half as wide, from front to rear, as it is long, from wing base to wing base, but often it is nearly three-fourths as wide as it is long). A considerable area

on the center of the disc (in middle of black band) naked, this area being smooth in the middle, but strongly punctate around its margins. Mesopleura covered with yellow pile to bases of legs. Metapleura and sides of median segment with mostly yellow pile.

Abdomen.—Dorsum: segment one yellow; segment two yellow on its basal middle and also more or less so on its hind margin, especially on its hind corners, the remaining portion being black; segment three yellow; segments four, five and six black. Venter dark. Epipygium with a distinct longitudinal median apical carina. Hypopygium not carinate.

Wings.—Very dark and with distinct violaceous reflections.

Legs.—Coxæ mostly dark, but usually with some yellow hairs on outer sides; trochanters usually entirely black, but sometimes with some yellow pile on lower sides; femora and tibiæ entirely dark.

Worker.—Like queen, but wings distinctly lighter, though still dark; epipygium without a distinct median carina; second dorsal abdominal segment sometimes with no yellow pile on its basal middle and sometimes with no yellow on its hind corners or hind margin.

Male. Head.—Rather elongate. Face, occiput, and ventro-lateral portions bearing a mixture of black and shorter and finer whitish pile. Malar space as long as its width at apex, nearly one-fourth as long as eye. Clypeus mostly naked over a large portion of disc; sides and basal portion clothed with a mixture of black hairs and short, fine, whitish pile; middle of anterior portion with an elongate smooth area; otherwise densely and coarsely punctate. Third and fourth antennal segments subequal in length, the fifth much longer than either.

Thorax.—Coloration of pile about like that of worker, but with black interalar band distinctly narrower.

Abdomen.—Dorsum: coloration of pile like that of queen, but with considerable yellow on extreme sides of fourth segment; hind margin of second segment bearing yellow pile throughout its length; apical segment dark. Venter mostly dark, but with the lateral portions of the apical margins of most of the segments fringed more or less with pale hairs.

Genitalia.—Outer spatha much like that of *pennsylvanicus* (fig. 126). Inner spatha much like that of *pennsylvanicus* (fig. 132). Claspers (fig. 182) of medium length and apparently powerful; in general, much like those of *pennsylvanicus* (fig. 70). Sagittæ much like those of *fervidus* (fig. 102), but with no serration of the outer margins of the heads. Uncus moderately broad at the base, but gradually tapering to the rather narrow recurved tip.

Wings.—Strongly infuscate; somewhat lighter than those of worker.

Legs.—Coxæ with more or less yellow hair; hind trochanters dark, but the fore and middle pair with much yellow pile on their lower sides; fore and middle femora with much pale yellow pile on their lower

sides; hind femora entirely dark; tibiæ all dark. Hind tibiæ with their outer faces flat, or slightly convex, and very sparsely hairy on their distal portions; their fore and hind fringes short, but long enough to form very weak corbiculæ. Hind metatarsi with outer faces deeply concaved; without long fringes.

Dimensions.—Length: queen, 16 mm. to 20 mm.; worker, 12 mm. to 15 mm.; male, about 12 mm. Spread of wings: queen, 35 mm. to 42 mm.; worker, 29 mm. to 34 mm.; male, about 28 mm. Width of abdomen at second segment: queen, 8 mm. to 9½ mm.; worker, 5½ mm. to 7½ mm.; male, about 5½ mm.

Redescribed from four queens, three workers and one male.

Habitat.—Brazil (Constantia, Ypanema, Minas Geraes) and Paraguay (Sapucay, Asuncion and San Bernadino). The specimens before me came from Brazil and Paraguay. Handlirsch (vide supra) records this species from Mexico, but his record needs confirmation.

This species is apparently allied to *steindachneri* and *medius*. It seems to be comparatively constant in its characters. The yellow pile is pale straw-color.

Species of the Fraternus Group South of the United States.

Bombus (Bombias) mexicensis new species.

Bombus ternarius (var. d.) Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 230, ♀ (misidentification).

" *mexicensis* Franklin, Trans. Amer. Ent. Soc., XXXVII, 1911, p. 163, ♀.

Types.—Described from four cotype queens from Mexico, of which one is deposited in the collection of the Massachusetts Agricultural College, and three in the collection of the United States National Museum.

Pile rather short and rather coarse. Malar space short. Head mostly dark. Dorsum of thorax yellow, with a broad black interalar band. Mesopleura mostly yellow. Dorsum of abdomen yellow, ferruginous and black. Wings rather light. Legs black.

Queen. Head.—Short for its width. Face mostly black, but with a faint sprinkling of short pale pile intermixed with the black hair on the region around the bases of the antennæ. Occiput with mostly black pile, but with an admixture of pale yellow hairs, especially on the very hind margin. Sides of head behind eyes entirely dark. Malar space

considerably shorter than its width at apex, slightly less than one-sixth as long as the eye. Clypeus shining and rather sparsely and delicately punctate. Ocelli not far below supra-orbital line, slightly above narrowest part of vertex; lateral ones somewhat nearer to margins of eyes than to each other. Flagellum of antennæ about one and two-thirds times as long as scape; third antennal segment equal to fourth and fifth taken together, the fifth scarcely longer than the fourth.

Thorax.—Dorsum yellow, but with a very broad and well defined black interalar band (this band being distinctly, but not greatly, more than half as wide, from front to rear, as it is long, from wing base to wing base, and of nearly equal width all the way across, though slightly narrower toward the bases of the wings); middle of disc with a longitudinally elongate area, large enough to be very noticeable to the naked eye (this area being within the black interalar band), naked, mostly smooth and shining. Mesopleura often covered with yellow pile very nearly to the bases of the legs and always with the yellow extending down as far as two-thirds of the distance from the level of the bases of the wings toward the bases of the legs. Metapleura sometimes clothed for most part with yellow pile and sometimes with only their very upper ends bearing yellow hair. Sides of median segment sometimes entirely dark, but often with considerable yellow hair.

Abdomen.—Dorsum: segment one yellow; segment two yellow on basal middle, but with ferruginous pile on the extreme sides and along the hind margin, the yellow patch narrowing toward the front margin on the sides of the segment; segment three ferruginous; segment four with some ferruginous pile and a few black hairs on the very middle, at least at the base, but for the most part clothed with yellow pile; segment five black, but with a few yellow hairs on the extreme sides; segment six dark. Venter usually entirely dark. Epipygium with a low, rounded, longitudinal median carina on its very apical portion. Hypopygium also tending to be carinate in the middle on its very apical portion.

Wings.—Only very moderately infuscate; the fore pair generally lightest across their middle portion.

Legs.—Pile, including the corbicular fringes, all dark.

Dimensions.—Length, 14 mm. to 15½ mm.; spread of wings, 34 mm. to 36 mm.; width of abdomen at second segment, 7 mm. to 8½ mm.

This species has its closest relative in *rufocinctus*, of which it may indeed be only a subspecies. I have been unable to separate it structurally from *rufocinctus*, but it may readily be separated from that species, as it is known to me, by its darker occiput and its much wider and better defined black

interalar band. The yellow pile of *mexicensis* is pale straw-yellow. The ferruginous pile is somewhat variable in shade, but, when the shade is deepest, it is perhaps best described as dark ferruginous.

Bombus (Bombias) ramonensis new species.

Type.—Described from a single male, deposited in the collection of the United States National Museum. Type locality, San Ramon (Costa Rica?).

Malar space very short. Pile rather short and rather fine. Ocelli separated from margins of eyes by less than half their own diameters. Third and fifth antennal segments subequal in length. Mostly dark. Yellow or whitish pile present on face, sides of head behind eyes, front part of thoracic dorsum, scutellum and first, sixth and seventh dorsal abdominal segments.

Queen and worker.—Unknown.

Male. Head.—Rounded. Face, from front margin of clypeus to fully half-way between bases of antennæ and ocelli, mostly clothed with yellow pile; extreme sides of face, close to margins of eyes, however, with dark hair. Ventro-lateral portions of head with a noticeable amount of yellow pile intermixed with the black. Malar space scarcely half as long as its width at apex. Clypeus almost entirely covered with a rather thick clothing of yellow pile. Ocelli large, placed at more than one-third of the distance from the supra-orbital line towards the bases of the antennæ; lateral ocelli removed from margins of eyes by less than half of their own diameter; space between eyes somewhat narrower above ocelli than at ocelli. Eyes greatly swollen and bulging out from sides of head, the vertex being distinctly depressed between them. Third and fifth antenual segments subequal in length, the fourth distinctly shorter than either.

Thorax.—Dorsum mostly black, but with a band of yellow pile across the front part (this band reaches down on the mesopleura to somewhat below the level of the bases of the wings) and the scutellum heavily fringed with yellow behind. Mesopleura mostly dark, but with an inconspicuous patch of yellow pile on their lower portion toward the bases of the legs, and with some yellow on their upper portion in front (the extension of the yellow band on the front part of the dorsum). Metapleura dark. Sides of median segment mostly dark, but with a slight admixture of pale hairs.

Abdomen.—Dorsum: segment one clothed mostly with yellow pile, but with some dark hair in middle; segment two mostly dark, but with some yellow hair on basal middle; segments three and four entirely dark; segment five mostly dark, but with whitish pile on hind corners; segments six and seven largely clothed with white pile,

but dark in middle. Venter mostly dark, but with considerable pale pile on apical half.

Wings.—Very moderately infuscate; veins so much darker than membranes as to contrast considerably with them; much the lightest in the region beyond the veins, being, in this portion, almost clear transparent.

Legs.—Mostly dark; hind femora and trochanters with a sprinkling of yellow hairs on their lower sides; middle tibiæ with a noticeable amount of whitish hair on their inner sides and with hind fringes faintly ferruginous. Hind tibiæ with outer faces slightly convex and sparsely hairy on apical two-thirds; their fore fringes very moderate and their hind ones long. Hind metatarsi between three and one-half and four times as long as their greatest width; their outer faces strongly concaved; their hind fringes long and of dark and ferruginous hairs mixed.

Dimensions.—Length, about 16½ mm.; spread of wings, about 39 mm.; width of abdomen at second segment, about 8 mm.

This species seems to have its closest ally in *fraternus*. It can be separated structurally from any other *Bombus* male known to me. Its pile is of a character somewhat similar to that of the male of *robustus*. The position of the ocelli and the degree of tumidity of the eyes are, however, distinctly different in the two species. This male may possibly be a color variant of the unknown male of *volucelloides*, though this seems highly improbable. The yellow pile of this species is a pale, dirty, straw-yellow.

Bombus (Bombias) haueri Handl.

Bombus haueri Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 234, ♀.
" " Dalla Torre, Cat. Hym., X, 1896, p. 521.
" " Cockerell, Cat. Abej. de Mexico, 1899, p. 19.
" " Franklin, Ent. News, XVIII, 1907, p. 91, ♀ ☿ ♂.

Types.—The queen type is in the collection of the k. k. Hofmuseum at Vienna. The worker and male types are in the collection of the United States National Museum. The worker came from Meadow Valley, Mexico, and the male from Eslava, Mexico.

Pile rather short and fine. Malar space rather short. Wings and tegs dark. Females with head black, pleura black, dorsum of thorax yellow with broad black interalar band, dorsum of abdomen with two basal segments yellow and the rest ferruginous-red. Males similar to

females in coloration, but with some yellow hair on face and occiput and with yellow pleura.

Queen. Head.—Rather broad and rounded in general form, with only dark pile. Malar space distinctly wider at apex than its length, not over one-sixth as long as eye. Clypeus, for most part, rather strongly and coarsely punctate, but sparsely so (almost smooth) toward the middle line. Ocelli large and distinctly below supra-orbital line, in narrowest part of vertex (distinctly *Bombias* in character). Third antennal segment about as long as fourth and fifth taken together.

Thorax.—Front part of dorsum covered with yellow pile back to tegulæ; a broad black band between bases of wings (this band is slightly more than half as broad, from front to rear, as it is long, from wing base to wing base). Tegulæ sometimes completely surrounded by black pile, but usually with yellow pile in contact with them on the upper side of their front end. Center of disc with a considerable area completely naked, the middle portion of this area being smooth and shining. Scutellum covered with yellow pile, the front median portion often being somewhat naked. Pleura, from bases of wings to bases of legs, and median segment black and with dark pile only (rarely there is a very slight sprinkling of yellow hairs on the pleura and on the sides of the median segment).

Abdomen.—Dorsum: segments one and two clothed with yellow pile; segments three, four and five densely covered with rich ferruginous-red pile; segment six clothed with short ferruginous-red hairs. Venter mostly dark, but with the apical fringes of the three apical segments more or less ferruginous. Hypopygium without a median carina.

Wings.—Dark, as in *B. crotchii* Cress., and with distinct violaceous reflections.

Legs.—Coxæ, trochanters, femora and tibiæ all black and bearing no light pile; corbicular fringes black.

Worker.—Much like queen, but with wings lighter and usually without violaceous reflections. Corbicular fringes proportionately longer than those of queen.

Male. Head.—Black, but with face below bases of antennæ rather strongly yellow, with black hairs intermixed; sides behind eyes black; occiput rather weakly covered with yellow hairs. Malar space very short, not much longer than pedicel of antenna. Ocelli large and placed far below supra-orbital line. Eyes greatly swollen, bulging out from sides of head. Antennæ with third segment fully as long as fifth, the fourth much shorter than either.

Thorax.—Dorsum entirely and densely covered with yellow pile, except for a broad, but rather indefinite (due to intermingling of yellow hairs), black band between bases of wings. Pleura covered with yellow pile to bases of legs.

Abdomen.—Dorsum: first three segments covered with yellow pile,

the remaining segments shading off toward the apex of the abdomen into rich ferruginous-red. Venter black at base, but, beginning a little behind the middle, the apical margins of the segments fringed more or less heavily, especially toward the side margins, with ferruginous hairs.

Legs.—Dark and with dark clothing.

Dimensions.—Length: queen, 19 mm. to 24 mm.; worker, 13 mm. to 17 mm.; male, 17½ mm. Spread of wings: queen, 47 mm. to 49 mm.; worker, 30 mm. to 32 mm. Width of abdomen at second segment: queen, 11 mm. to 12 mm.; worker, 6 mm. to 6½ mm.

I have here redescribed the queen from ten, and the worker from two, specimens. The description of the male here given is simply a transposition of the original description of that sex.

Habitat.—The records for this species, so far known, are all Mexican (Orizaba, Takubaya, Mexico City, Eslava and Meadow Valley—head of Rio Piedras Verdes—six miles south of Colonia Garcia, in the Sierra Madre of Western Chihuahua, at an altitude of about 7,000 feet).

The male type is not in good condition, the pile of the abdomen being badly matted. It seems probable that, in a good fresh specimen, the coloration of the abdomen of this sex would more nearly approximate that of the abdomen of the females.

This species apparently has its closest ally in *crotchii*.

Bombus (Bombias) brachycephalus Handl.

? *Bombus diligens* Smith, Journ. of Entom., I, 1861, p. 154, n. 5, ♀.
? " " Cresson, Proc. Ent. Soc. Phila., II, 1863, p. 110, n. 43–44, ♀.
? " " Cresson, Trans. Amer. Ent. Soc., VII, 1879, p. 230 (Catal.).
" *brachycephalus* Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 244, ♀ ☿ ♂; T. 10, F. 13.
" " Dalla Torre, Cat. Hym., X, 1896, p. 512.
" " Cockerell, Cat. Abej. de Mexico, 1899, p. 19 (Catal.).

Types. — Handlirsch described *brachycephalus* from two queens, two workers and one male, all collected by Bilimek in Mexico (Cuernavacca and Orizaba). These specimens are in the k. k. Hofmuseum at Vienna.

Pile rather fine. Head and thorax black (front part of male thorax often with more or less light or yellow pile); abdomen with basal segments black and apical segments ferruginous. Wings dark. Heads of queen and worker short and broad. Male with large eyes.

I have never seen either the queen or the worker of this species. Handlirsch described them together as follows:

"Head short and broad; clypeus strongly arched, thickly and coarsely punctate, somewhat less so in the middle; labrum deeply impressed in the middle; malar space nearly one-half shorter than it is broad at the end; mandibles and antennæ as in *dolichocephalus*. Hind metatarsus moderately pointed at the end. Hypopygium without a carina."

He also remarked concerning them as follows:

"The queen and worker agree as strikingly with the foregoing species" (*dolichocephalus*) "in the black color of the body with the red end segments as in the dark brown-black wings with their violaceous reflections."

Male. Head.—Broadly rotund-triangular. Pile entirely dark. Malar space but little more than half as long as its width at apex. Clypeus coarsely and densely punctate and very thinly clothed with rather long black hairs. Ocelli large and placed squarely in the narrowest part of the vertex, at about one-third the distance from the supra-orbital line towards the bases of the antennæ (eyes not converging above them at all), the lateral ones separated from the inner margins of the eyes by distinctly less than their own diameter. Eyes swollen a little less than those of *crotchii* male, slightly more than those of males of *morrisoni* and *separatus*. Third and fifth antennal segments about equal in length.

Thorax.—Center of disc of dorsum bare (the greater part of the dorsum has the appearance of having the pile rubbed off more or less), smooth and shining. Pile all dark, apparently usually pure black, but sometimes brown (the anterior portion of the dorsum of one specimen has a strong admixture of yellow hairs and probably there is sometimes a distinct yellow band in that region).

Abdomen.—Dorsum: segments one, two and three with black pile; basal portion of segment four with black pile and its apical portion clothed like segments five and six; segments five and six bearing only ferruginous-red or light ferruginous pile. Venter mostly dark, but with the apical fringes of the three apical segments more or less strongly ferruginous. Hypopygium broadly emarginate at apex.

Genitalia.—Outer spatha short and broad, resembling considerably that of *separatus* (fig. 29), but with anterior margin much less strongly incurved and side margins not incurved in front; middle of apical portion of ventral surface with only a few hairs and these short and in-

conspicuous. Inner spatha much like that of *fervidus* (fig. 101), but with sides of apical portion outcurved. Claspers (fig. 175 and fig. 188) appearing moderately short; with branches rather narrow and evenly rounded at distal end as seen from dorsal side; volsellæ reaching considerably beyond tips of sagittæ and squamæ, their apices but slightly rounded, appearing almost squarely truncate, and the middle of the inner side of each protruding inward, toward the middle line of the body, in a single broadly rounded projection; squamæ with outer lobe much larger than inner one and narrowing rapidly towards its narrowly rounded apex, the inner lobe not reaching, or scarcely reaching, mesad beyond the inner margin of the volsella. Sagittæ with shafts bent outward somewhat in the middle and with heads irregularly foliaceous-sickle shaped, the base of the sickle being very broad and the apex pointed. Uncus broad and tapering rather rapidly towards its distal end, the recurved tip being rounded and so depressed longitudinally in the middle as to appear channelled.

Wings.—Rather dark.

Legs.—Dark and with dark pile. Hind tibiæ with slightly convex outer faces, these faces being mostly bare, but with a few scattering hairs; the front fringe of these tibiæ short, but the hind fringe (of hairs) rather long. Hind metatarsi about three and one-half times as long as their greatest width; their hind fringes long and black; their outer faces nearly flat.

Dimensions.—Judging from the fact that this species has been long confused with *B. dolichocephalus* and that Handlirsch did not give measurements for it, it seems not improbable that the females of this species are, on the average, of about the same size as are those of *B. dolichocephalus*. If this is the case, the queens of this species are twenty or more millimeters in length. I have here described the male from two specimens, the measurements of which are as follows: Length, 12 mm. to 13 mm.; spread of wings, 30 mm. to 33 mm.; width of abdomen at second segment, 7 mm. to 7½ mm.

Habitat.—We have no record of this species outside of Mexico. My two males were both collected at Orizaba, Mexico. *B. diligens* of Smith came from Oajaca, Mexico.

While I have not been able to study this species, in comparison with others, sufficiently to get a very certain idea of its relationships, it seems to me, from my somewhat superficial study, that *crotchii* and *haueri* are its closest allies.

It is impossible to tell by the original description whether Smith's *diligens* was this species or the form to which Handlirsch gave the name *dolichocephalus*. Smith's type is probably still in the British Museum. Col. C. T. Bingham

wrote me that, while there are specimens labelled "*Bombus diligens*" in the collection of the British Museum, there are none bearing this name which are marked as type specimens, though most of Smith's types of *Bombus* species can be readily identified by distinguishing marks. It is therefore possible that Smith's type of *diligens* cannot be identified, though still extant. If this is the case, *brachycephalus* must stand permanently as the name of this species, even if Smith described this species, and not *dolichocephalus*, as *diligens*.

Bombus (Bombias?) ecuadorius Meun.

Bombus Ecuadorius Meunier, Journ. Sc. Lisboa, (2), II, 1890, p. 66, ♀.
" *ecuadorius* Dalla Torre, Cat. Hym., X, 1896, p. 518.
? " *robustus* var. *nigrothoracicus* H. Friese, Zeitsch. f. Systemat. Hym. und Dipt., IV Jahrg., Heft 3, May 1, 1904, p. 188, ♂.

I have not seen specimens of this species. The original description reads as follows:

"*Bombus ecuadorius* nov. sp.—Black, pubescence of thorax black; segments one and two yellow, the third covered with black pubescence, the fourth to sixth segments with white hair. Venter pale brown. Feet black, with black pubescence. Wings entirely tawny iridescent. Length 23 mm.

Head a little elongate, the pubescence black. Clypeus shining, its sides strongly punctate. Labrum rounded, with numerous punctures larger than those on the clypeus. Mandibles rather slender, their bases considerably removed from the eyes.

Thorax with black pubescence. Sides of mesothorax strongly punctate; the disc shining, with punctures sparse. Scutellum sparsely punctate. Abdomen with the first and second segments yellow, the third black, the fourth, fifth and sixth white. The first segment not punctate, the second densely punctate, with gloomy aspect.

The punctures of segments four, five and six are scattered and the surface is shining. Sixth dorsal segment concaved in the middle, calloused at the apex. Venter densely and deeply punctate. Sixth ventral segment without particular characters.

Feet black, their pubescence black. Bases of the hind femora punctate, their apices very feebly and obliquely striated.

Wings entirely tawny, with metallic reflections.

Very rare and captured by missionary Boetzkeo at Quito, at an altitude of 2,000 meters above the level of the ocean."

Friese's description of *robustus* var. *nigrothoracicus* is as follows:

"Var. ♂.—Thorax entirely black; segments one and two yellow-, three black-, four to six white-haired. Bolivia."

I have here placed Friese's form in the synonymy of *ecuadorius* entirely on the basis of these two descriptions.

In my opinion, this species is really a variety either of *robustus*, as Friese placed it, or of *butteli*. If it is really a variety of *robustus*, then the name *ecuadorius* should be placed in the synonymy of that species. If, however, *ecuadorius* and *butteli* are the same species, the name *butteli* (1903) must go into the synonymy of *ecuadorius*. If this species is a variety of *robustus* or of *butteli*, it belongs to the subgenus *Bombias*. *Ecuadorius* may possibly, however, be a valid species by itself.

Bombus (Bombias) sulfuratus Friese.

Bombus robustus var. *sulfuratus* H. Friese, Deutsch Ent. Zeitschr., 1911, p. 457.

Types.—The specimens from which Friese described this form came from Salta, Argentina (2,500 meters altitude), and are in his private collection. While this form is apparently closely related to *robustus*, I cannot agree with Friese in considering it a variety of that species, as the character of the pile seems to be noticeably different. *Robustus* has longer and finer and rather less dense pile than has this species. Friese has sent me a queen and a worker of this species, determined by him and collected in Argentina (Salta) by Steinbach, from which the following discription is made:

Pile of medium length and texture. Malar space rather short. Thorax with mostly yellow pile, with black interalar band. Dorsum of abdomen with first three segments and base of fourth clothed with straw-yellow pile; apical part of fourth segment with pale ferruginous pile; fifth and sixth segments mostly white-haired. Wings rather light.

Queen. Head.—Face above and below bases of antennæ with very pale yellow and black pile mixed. Occiput with mostly black pile, but with some pale yellow admixed. Sides of head behind eyes mostly dark, but with a very noticeable admixture of pale yellow pile. Malar space about three-fourths as long as its width at apex, about one-fifth as long as eye. Clypeus, for most part, very sparsely punctate with moderate punctures. Ocelli large and placed distinctly below the supra-orbital line, almost exactly in the narrowest part of the vertex, the lateral ones distinctly nearer to the eye margins than to each

other. Third antennal segment longer than fifth, the fifth longer than the fourth.

Thorax.—Dorsum clothed with straw-yellow pile, except for black band between bases of wings (this band well defined and without pile in middle). Mesopleura with mostly yellow pile from bases of wings to bases of legs. Metapleura with at least their upper portions bearing mostly yellow pile. Sides of median segment with mostly yellow pile.

Abdomen.—Dorsum: segments one to three, inclusive, clothed with straw-yellow pile; segment four with pale yellow pile on basal portion and with pale ferruginous pile on apical portion; segment five with mostly white hair (the bases of the hairs, making up the pile on this segment, appear slightly ferruginous); segment six thinly clothed with mostly white pile. Venter with mostly dark pile, but the hairs fringing the apical margins of the middle and apical segments inclined to be pale in color towards the sides of the segments.

Wings.—Somewhat infuscate, but light in color for a *Bombus* queen; about as dark as those of *rufocinctus* queen.

Legs.—Trochanters with mostly dark pile, but with at least a sprinkling of pale hairs on their lower sides. Femora mostly dark, but with more or less pale hair on their lower sides, the two hind pairs in particular having a noticeable amount of such pile. Tibiæ with dark hair, including the corbicular fringes.

Worker.—Like queen, but with fifth dorsal abdominal segment clothed with entirely ferruginous pile. Sides of head behind eyes with only a very slight admixture of pale yellow hairs.

Dimensions.—Length: queen, 16 mm.; worker, 13½ mm. Spread of wings: queen, 37 mm.; worker, 30 mm. Friese originally described the queen as being from 22 mm. to 23 mm. in length.

Bombus (Bombias) weisi Friese.

Bombus weisi Friese, Zeitsch. f. System. Hym. und Dipt., Jahrg. III, Heft 4, 1903, p. 253, ♂ (♀ ?), and the variety *albocaudata.*

" " Friese, Zeitsch. f. System. Hym. und Dipt., Jahrg. IV, Heft 3, p. 188, n. 17, ♂.

Types.—In Friese's private collection. The species was originally described from two workers and nine males, all from Costa Rica (San Carlos). The variety *albocaudata* was described from a single male from Bolivia.

I have never seen a female of this species, and I seriously question whether the workers described by Friese did not in reality belong to the species *montezumæ*, as his description answers perfectly for a color variation of that species. Friese

has sent me a male, from Colombia (San Antonio), determined by him as *weisi*, and I am unable to connect it with any other species known to me.

Queen.—Unknown.

Worker.—Friese's description is as follows: "Black, black-haired; like *B. ephippiatus* var. *lateralis*, but larger; segments 1–3 yellow-, 4–5 black-, 6 red-haired; with longer cheeks. Length, 15 mm.; width of thorax, 7½ mm."

Male.—The single specimen before me, received from Friese, may be described as follows:

Head.—Triangular in form. Face covered with a large and rather dense patch of nearly pure yellow pile, this patch extending from near the front margin of the clypeus to considerably above the bases of the antennæ and from eye margin to eye margin. Occiput with a patch of mostly yellow pile in the middle, but with numerous black hairs intermixed. Sides of head behind eyes clothed for most part with bright yellow pile. Malar space but little more than half as long as its width at apex. Ocelli large and placed very slightly below narrowest part of vertex, at about one-third of the distance from the supra-orbital line toward the bases of the antennæ, the lateral ones separated from the eye margins by about half their own diameter. Eyes considerably swollen, about like those of *robustus* male. Third and fifth antennal segments subequal in length, the fourth shorter than either.

Thorax.—Dorsum clothed for most part with yellow pile, but with a very poorly outlined dark band between bases of wings (this band being made up of a mixture of black and yellow pile, with the black predominating); middle portion with large naked area; front portion of scutellum also naked in middle. Mesopleura covered with bright yellow pile from bases of wings to bases of legs. Metapleura and sides of median segment with mostly yellow pile.

Abdomen.—Dorsum: segment one clothed with yellow pile; segment two with mostly yellow pile, but with an inconspicuous amount of black hair on its apical middle; segments three to seven, inclusive, with black pile. Venter with mostly dark brown or black pile.

Wings.—Smoky, but not very dark.

Legs.—Trochanters and femora of middle and hind pair of legs with considerable yellow pile, especially those of the hind pair; front femora with mostly black pile. Tibiæ almost entirely dark. Hind tibiæ with outer faces slightly convex and sparsely hairy, with front fringes moderate and hind ones long, forming weak corbiculæ. Hind metatarsi fully four times as long as their greatest width, their hind fringes long and dark brown in color.

Dimensions.—Male: length, 17 mm.; spread of wings, 37 mm.

This species is probably closely related to *robustus*, though the ocelli are placed a trifle farther down from the supra-orbital line than is the case with the male of that species.

Friese's descriptions of the male and of the variety *albocaudata* are as follows:

"♂ with elongate antennæ, very large eyes, yellow-haired face, thorax mostly yellow-haired, black banded, segments 1–2 yellow-, 3–7 black-haired, venter yellowish-haired. Length 15–16 mm." "Var. ♂—with segments 5–7 white-haired. Var. *albocaudata* n. var."

The variety *albocaudata* may be a color variant of *robustus*. Is it the same as *B. tecumanus* Vachal?

In Zeitsch. f. System. Hym. und Dipt., Jahrg. IV, Heft 3, page 188, Friese described a form under the name *Bombus weisi* as follows: "Abdomen entirely without yellow pile. Should it, perhaps, be considered as a black abdomened form of *robustus?* ♂ from Banos (Ecuador)." This form may be a color variant of *robustus*.

Bombus (Bombias) tecumanus Vachal.

Bombus tecumanus Vachal, Rev. Ent. France, XXIII, 1904, p. 10, ♂.

Type.—Vachal writes me that this specimen is in his private collection and that, after his death, it will be deposited in the Museum Histoire Naturelle de Paris, to which it is already given by testament.

This species is unknown to me. Vachal's original description is as follows:

"*Bombus tecumanus* n. sp. ?—Black, black-haired; band on the collar, band on the scutellum, segments 1–2, with yellow pile; clypeus, frons and vertex with admixture of yellow; the very apex of the abdomen white. Head short; cheeks shorter than wide; third antennal segment obconical, longer than the fourth, almost equalling the fifth; eyes swollen, slightly converging above, removed from the ocellus by fully the diameter of the latter. Wings hyaline. Hind metatarsi slender, with long hind fringes. Length, 15 mm. to 16 mm.; wing, 8 mm. to 9 mm."

"One male from the province of Tucuman (Girard), my collection. Is it the male of *Bombus robustus*?"

It is evident from the description of the eyes that this species belongs to the subgenus *Bombias*. It cannot, however, be a variation of *robustus*, for in that species the lateral

ocelli of the male are removed from the margins of the eyes by distinctly less than their own diameter. Is it the same as Friese's *B. weisi albocaudata* male? Tucuman is in Argentina.

Bombus (Bombias) robustus F. Sm.

Bombus robustus Smith, Cat. Hym. Brit. Mus., II, 1854, p. 400, n. 59, ♀.
" " Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 237, ♀ ☿.
" " Dalla Torre, Cat. Hym., X, 1896, p. 544.
" " Cameron, Trans. Amer. Ent. Soc., XXIX, 1903, p. 237.
? " *weisi* H. Friese, Zeitsch. f. System. Hym. und Dipt., Jahrg. III, Heft 4, 1903, pp. 253 and 254, ♂ (not the worker), and the variety *albocaudata*.
" *robustus* H. Friese, Zeitsch. f. System. Hym. und Dipt., Jahrgang IV, Heft 3, May 1, 1904, p. 188, n. 16.
? " " var. *cinctus* H. Friese, ibid., ☿.
? " " var. *hortulans* H. Friese, ibid., ♀ ☿ ♂.
? " " var. *nigrothoracicus* H. Friese, ibid., ♂.
? " " var. *rufocaudatus* H. Friese, ibid., ♂.
" " H. Friese, Flora og Fauna (Denmark), 1908, p. 92.
? " " var. *rufocaudatus* H. Friese, ibid., ♂.
? " " var. *steinbachi* H. Friese, ibid., ♀.

Types.—Col. C. T. Bingham succeeded in identifying Smith's type queen, for me, in the collection of the British Museum. It was collected in Colombia. The types of Friese's varieties are in his private collection. The worker type (Handlirsch description), also from Colombia, is in the collection of the k. k. Hofmuseum at Vienna. The typical male is here described for the first time—from three specimens, of which one is deposited in the collection of the Massachusetts Agricultural College and the other two in the collection of the United States National Museum. These males all came from Colombia.

Pile rather long and rather fine. Malar space short in the male and rather short in the females. Ocelli of females distinctly below the supra-orbital line and very slightly above the narrowest part of the vertex; those of the male considerably below the supra orbital line and in the narrowest part of the vertex, the lateral ones being separated by about half their own diameter from the eye margins. Eyes of male considerably

swollen. The coloration of the pile possibly quite variable, but the heads of the females and the pleura and legs of all castes dark and the apex of the abdomen almost always white above in all castes. Wings rather light.

Typically: the dorsum of the thorax yellow, with a black interalar band, and the three basal dorsal abdominal segments yellow.

Queen. Head.—Pile almost entirely dark, sometimes with an inconspicuous admixture of very short tawny whitish hair with the longer dark hair on the occiput and on the face above and below the bases of the antennæ. Malar space considerably shorter than its width at apex, nearly one-fifth as long as the eye. Clypeus, for most part, entirely smooth. Ocelli large and placed distinctly below the supra-orbital line, but slightly above the narrowest part of the vertex, the lateral ones much nearer to the margins of the eyes than to each other. Third antennal segment nearly as long as fourth and fifth taken together, the fifth longer than the fourth.

Thorax.—Dorsum yellow, with a well defined black band between the bases of the wings (this band is apparently somewhat variable in width, being, in one of the specimens before me, very nearly half as long, from front margin to rear margin, as it is wide, from wing base to wing base, while, in the other specimen, it is not nearly half as long as wide); a naked area present on the middle of the disc. Mesopleura somtimes entirely dark and sometimes with the yellow pile on the front part of the dorsum extending down to somewhat below the level of the bases of the wings. Metapleura and sides of median segment entirely dark. No light or yellow tufts behind or beneath the bases of the wings.

Abdomen.—Dorsum: segments one and two yellow; segment three entirely yellow or with some black hair on the very hind margin, especially toward the extreme sides; segment four clothed entirely with white pile or mostly white with black pile on the very basal portion, especially the anterior corners; segment five white; segment six mostly dark in the middle, but with some white hair on the sides. Venter mostly dark, but with the sides of the apical margin of the fifth segment fringed more or less with whitish hair. Epipygium with a short and very broad and shallow longitudinal median impression toward the apex. Hypopygium without a distinct median carina.

Wings.—Very light for a *Bombus* queen; only very moderately infuscate; perhaps best described as light, almost transparent, brown.

Legs.—All the pile, including the corbicular fringes, dark brown or black.

Worker.—Like the queen, but with distinctly darker, rather strongly infuscate, wings. Clypeus with very sparse, but coarse, punctures.

Male. Head.—Face bearing a mixture of dark and whitish or pale yellow pile above and below the bases of the antennæ (most of the light pile is very much shorter than the dark hair of the mixture).

Clypeus, for most part, densely covered with nearly pure pale yellow pile. Occiput mostly dark, but bearing a mixture of dark and yellow hairs in the middle. Behind the eyes dark. Ventro-lateral portions of head almost entirely dark, but with a slight admixture of yellow hairs almost opposite the lower ends of the eyes. Malar space but little more than half as long as its width at apex. Ocelli large and placed somewhat less than one-third of the distance toward the bases of the antennæ from the supra-orbital line, exactly in the narrowest part of the vertex, the lateral ones being separated from the margins of the eyes by about half their own diameter. Eyes swollen so as to cause the vertex to appear distinctly depressed between them, about as in the male of *separatus*. (The antennæ of all the males before me are lost.)

Thorax.—Coloration of pile about like that of the queen and worker, but the black interalar band fully half as long, from front to rear, as wide, from wing base to wing base.

Abdomen.—Dorsum: segments one, two and three entirely covered with yellow pile; segment four dark, but with some of the hair on its hind margin tipped with white; segments five, six and seven clothed with long, fine white pile (most of the hairs of this pile are dark brown or black at the base and shade out to white, so as to appear entirely white unless examined with a lens). Venter mostly dark. Apical margin of both epipygium and hypopygium entire.

Genitalia.—Outer spatha in general form much like that of *rufocinctus* (fig. 122), but much longer (*i. e.*, with a much greater distance between the front and hind margins); the hair on the ventral surface of the apical portion sparse and short, being thickest and most conspicuous on the hind corners. Inner spatha appearing much like that of *rufocinctus* (fig. 55), but with a conspicuous rounded-triangular fenestra on each side of the middle of the front part of the apical portion. Claspers (figs. 181 and 197) long, but apparently powerful; branches broadly rounded at apex as seen from dorsal side; squamæ strongly bilobed, the outer lobe being much the larger, triangular in shape and with evenly curved inner and outer margins and pointed apex, and the inner lobe being rounded at the apex and extending mesad but slightly beyond the inner margin of the volsella. Volsellæ only very moderately hairy; considerably widened in the middle by a broadly rounded protuberance on the inner side of each; their apical projections not very large, but conspicuous and with serrate inner margins. Sagittæ with long and nearly straight shafts and recurved heads; the heads considerably foliaceous and projecting mesad in a somewhat sickle-shaped foliaceous extension; considerably outreached by the apices of the volsellæ. Uncus quite broad at base, but tapering gradually to the moderately wide, rounded and recurved tip.

Wings.—Somewhat darker than those of the queen, but somewhat lighter than those of the worker.

Legs.—The pile all dark. Outer faces of hind tibiæ convex and sparsely hairy, their fore fringes moderate and their hind fringes long, forming distinct, though weak, corbiculæ. Hind metatarsi fully three and one-half times as long as their greatest width, their outer faces distinctly concaved and their hind fringes very long.

Dimensions.—Length: queen, 19 mm. to 21 mm.; worker, about 13 mm.; male, 14 mm. to 15 mm. Spread of wings: queen, 43 mm. to 46 mm.; worker, 34 mm.; male, nearly 35 mm.

The queen is here redescribed from two specimens and the worker from one.

Habitat.—We have certainly valid records for this species from Colombia, Venezuela and northern Argentina (Tucuman and Salta) only. There are specimens before me from Colombia and Venezuela. Cameron records it from Ecuador (Pichincha), at an altitude of 11,500 feet. It is almost certainly present in Peru, Bolivia and northern Chili. The species probably has a considerably wider range than is indicated by these records.

Variation.—Friese has described the following forms as varieties of this species:

"1. Var. ☿. Segments one and two yellow-, three black-, four red-, five and six white-haired. Bolivia. Var. *cinctus.*" Friese has sent me an identified specimen of this form, and he is apparently correct in regarding it as a variety of *robustus*. The fourth dorsal segment, however, is not red, but yellow, in the specimen sent me. This specimen came from Bolivia.

"2. Var. ♂ ♀ ☿. Segments 1–3 black-, 4–6 white-haired. ♀ usually with yellow tufts of hair on segment three. Banos (Ecuador). Var. *hortulans.*" Friese has sent me a worker and male of this form, and I agree with him in considering it a variant of *robustus*.

"3. Var. ♂. Thorax entirely black; segments one and two yellow-, three black-, four to six white-haired. Bolivia. Var. *nigrothoracicus.*" This form is unknown to me, as are also the two following:

"4. Var. ♂. Thorax yellow-haired, with dark cross-band; segments one and two yellow-, three black-, four to six red-haired, six often with single whitish hairs. Argentiua (Tucuman). Var. *rufocaudatus.*"

"5. Var. *steinbachi.* Yellow are: broad bands over pronotum and scutellum, segments one and two. Black: band over mesonotum, segments three and four. White: end of segment four and five and six entirely. (Colored exactly like *Bombus asiaticus* Mor.). ♀. Salta, Argentina, month of March (Steinbach collector)."

The form *hortulans* indicates a marked variation, on the part of *robustus*, toward *volucelloides*, with which it is closely allied.

Nigrothoracicus appears to belong in the synonymy of *ecuadorius*, but *ecuadorius* may, in reality, be a variety of *robustus*. If *ecuadorius* is a variety of *robustus*, it gives additional evidence that *robustus* grades strongly toward *volucelloides*.

Rufocaudatus may be a variety of *robustus*, but, because of its color characters, I suspect it of having affinities with *opifex*.

Steinbachi is probably a valid variety of *robustus*.

Volucelloides is, beyond question, the closest relative of *robustus*, and it may, indeed, be only a subspecies of it. The yellow pile of this species varies in shade from deep straw-yellow to very pale straw color.

Bombus (Bombias) volucelloides Grib.

Bombus volucelloides Gribodo, Bull. Soc. Ent. Ital., XXIII, 1891, p. 119, ♀.

? " sp. Whymper, Trav. Among Great Andes Equat., 1892, p. 356.

" *volucelloides* Gribodo, Bull. Soc. Ent. Ital., XXV, 1893, p. 266, n. 14.

" " Dalla Torre, Cat. Hym., X, 1896, p. 563.

" *leucomelas* Crawford and Swenk, Can. Ent., XXXV, 1903, p. 268, ♀ ♂.

" *vogti* Friese, Zeitschr. f. System. Hym. und Dipt., Jahrgang III, Heft 4, 1903, p. 254, n. 3, ♀ ♂.

" *volucelloides* Crawford, Trans. Amer. Ent. Soc., XXXII, 1906, p. 157 (name omitted by mistake).

Type locality.—Chiriqui. Friese's specimens of *vogti* are in his private collection.

Mostly black, but the disc of the thorax usually mostly covered with dark cinereous pile and the apical dorsal abdominal segments clothed with white hair. Ocelli of queen and worker placed almost exactly in the narrowest part of the vertex. Legs black. Wings very dark.

Queen. Head.—Rather broad and rounded. Pile all dark. Malar space shorter than its width at apex, but little more than one-sixth as long as the eye. Clypeus very delicately punctate and shining. Ocelli large and placed considerably below the supra-orbital line, just

about in the narrowest part of the vertex. Third antennal segment much longer than the fifth, not greatly shorter than the fourth and fifth together; the fifth somewhat longer than the fourth.

Thorax.—Dorsum covered with dark cinereous pile (this pile is a mixture of black hairs and mostly shorter and finer white pile or down); a considerable area on the center of the disc naked. Pleura and sides of median segment entirely dark.

Abdomen.—Dorsum: segment one black; segment two black, but with apical margin bearing white hair. Segmeuts three, four and five covered with white pile; segment six dark in the middle, but with white hair on the sides. Venter mostly dark, but with fringes of apical margins of most of the apical segments more or less white or whitish. Epipygium with a very slight longitudinal median carina on very apical portion. Hypopygium without a median carina.

Wings.—Very dark. With strong violaceous reflections. The transverse median vein of the fore wings forming nearly a right angle with both the median and the anal vein.

Legs.—Pile entirely dark.

Worker.—Like the queen, but the clypeus rather more coarsely punctate.

Male.—Unknown.

Dimensions.—Length: queen, 20 mm. to 26 mm.; worker, 13 mm. to 15 mm. Spread of wings: queen, 46 mm. to 50 mm.; worker, about 34 mm.

The typical queen is here described from two specimens from Boquete, Chiriqui. There are specimens before me showing the following variations:

Color Variant 1.—Like the typical queen, but with no white hair on the apical margin of the second dorsal abdominal segment. One specimen, from Boquete, Chiriqui.

Color Variant 2.—Like the typical queen, but with the second dorsal abdominal segment entirely black and with the basal portion of the third segment clothed with black pile. One specimen, from Colombia.

Color Variant 3.—Like Color Variant 2, but with the third dorsal abdominal segment entirely black, except the very apical margin. One queen from Chiriqui and one from Ecuador.

Color Variant 4.—(= *vogti* H. Friese). Like Color Variant 3, but with the third dorsal abdominal segment entirely black and with the basal half of the fourth segment also covered with black pile. One queen, from Bolivia (Tarata).

Color Variant 5.—Like the typical worker, but with all but the last two dorsal abdominal segments covered with entirely black pile. One worker, from Bolivia (Tarata).

Color Variant 6.—Like Color Variant 3, but with the short, fine pile

on the dorsal disc all dark, thus making the pile as a whole on this region black instead of dark cinereous.

Color Variant 7.—Like typical worker, but with the second, third and fourth dorsal abdominal segments entirely black and the fifth segment also dark, except for a fringe of white hair on the basal margin and on the extreme sides; the sixth segment almost entirely dark, with only a few white hairs on the extreme sides; venter entirely dark. One specimen, from Peru (Chanchamayo).

Habitat.—The following are our valid records for this species: Chiriqui (Boquete), Costa Rica (Cartago, Zarzero, Volcano Irazu, Monte Redonda), Colombia (Popayan), Ecuador, Peru (Chanchamayo, Callanga and Marcapata) and Bolivia (Tarata). This species is most closely related to *robustus*.

The pile of this species is somewhat longer and finer than the average.

A queen and worker of *vogti*, determined and labelled by Friese, are before me, and there can be no doubt that *vogti* belongs with *volucelloides*.

Mr. J. C. Crawford has written me that the name "*Bombus volucelloides*" was omitted by mistake when page 157 of volume xxxii, 1906, of the Transactions of the American Entomological Society was printed. This name should have appeared at the beginning of the third line from the bottom of the page.

Bombus (Bombias) funebris F. Sm.

Bombus funebris Smith, Cat. Hym. Brit. Mus., II, 1854, p. 400, n. 60, ♀.
? " sp., Whymper, Trav. Among Great Andes Equat., 1892, p. 356.
" *funebris* Dalla Torre, Cat. Hym., X, 1896, p. 521.
" " Crawford and Swenk, Can. Ent., XXXV, 1903, p. 268.
" " Cameron, Trans. Amer. Ent. Soc., XXIX, 1903, p. 237.

Type.—Col. C. T. Bingham succeeded in definitely locating the specimen, from which Smith described the queen of this species, in the collection of the British Museum. It was collected in Ecuador (Quito). The worker and male are here described for the first time—from two cotypes of the

former and three of the latter, one of each being deposited in the collection of the Massachusetts Agricultural College and the rest in the collection of the United States National Museum. The worker cotypes were collected at Callanga, Peru, and the males in Ecuador.

Black and with entirely black pile, except the disc of the thorax and the apical portion of the abdomen above clothed with white pile. Wings rather light.

Queen. Head.—Clothed entirely with dark brown or black pile. Malar space shorter than its width at apex, between one-fifth and one-sixth as long as eye. Clypeus, for most part, sparsely, but rather coarsely, punctate; densely punctate on sides of very front part. Ocelli somewhat below supra-orbital line, but distinctly above narrowest part of vertex, the lateral ones somewhat nearer to the margins of the eyes than to each other. Third antennal segment nearly as long as the fourth and fifth taken together; the fifth somewhat longer than the fourth.

Thorax.—Disc of dorsum clothed with white pile; otherwise entirely dark brown or black.

Abdomen.—Dorsum: segments one and two entirely black; segment three black, but sometimes with some white hairs on its apical middle; segments four and five clothed entirely with white pile; segment six mostly dark, but with white pile on the extreme sides. Venter mostly dark. Neither the epipygium nor the hypopygium with a carina.

Wings.—Only very moderately infuscate, light for a *Bombus* queen. The transverse median vein of the fore pair coalescent at the base, for a very short distance, with the base of the discoidal and bent so as to form a slightly obtuse inner angle with both the median and the anal vein.

Legs.—Clothed with entirely dark pile. Hind margins of hind metatarsi unusually arcuate, about as in the *Terrestris* group.

Worker.—Like queen, but with no white hair on third abdominal segment and with pile on very base of fourth segment black.

Male. Head.—Triangular. Pile all dark brown or black. Malar space about two-thirds as long as its width at apex. Clypeus, for most part, rather heavily clothed with pile. Ocelli placed at about one-fifth the distance from the supra-orbital line toward the bases of the antennæ, slightly above the narrowest part of the vertex; the lateral ones separated by about their own diameter from the margins of the eyes. Eyes somewhat swollen, about like those of male *rufocinctus*. Third and fifth antennal segments subequal in length, the fourth shorter than either.

Thorax.—Coloration of pile about like that of queen and worker.

Abdomen.—Dorsum: segments one, two and three dark; segment

four mostly dark, but with white pile on apical margin; segments five, six and seven clothed with white pile (sometimes many of the hairs of this pile are black at the base and shade out quickly into white). Venter usually mostly dark, but with some of the hair on some of the apical segments whitish. Hypopygium entire at apex.

Genitalia —Outer spatha (fig. 153) short and wide; its front margin deeply and evenly incurved, the side margins evenly, but not strongly, outcurved, the hind margin deeply and evenly incurved; ventral surface of hind portion rather sparsely hairy with long hairs. Inner spatha in general form much like that of *crotchii* (fig. 130), but without fenestræ and with hind margin of apical portion more deeply emarginate. Claspers (figs. 178 and 180) powerful in appearance; branches with apices appearing rather quadrate with rounded corners as seen dorsally; volsellæ moderately thick and tapering somewhat, so as to be narrowest at distal end, their apical projections small, but noticeable; squama with two well developed lobes, the outer one being the larger and having its outer face deeply concaved and strongly roughened by protuberances and striations. Sagittæ with long shafts and recurved, broadly foliaceous heads, the outer margins of these heads being serrated. Head of sagitta extending back fully as far as tip of squama and tip of volsella not extending very far beyond either the sagitta or the squama. Uncus broad and tapering slowly toward the recurved and mesially grooved tip. Inner end of inner lobe of squama reaching but little beyond inner margin of volsella.

Wings.—Colored about like those of queen.

Legs.—Mostly dark. Hind tibiæ with outer faces convex and more or less hairy throughout (sometimes with only a very few scattering hairs on the apical half), their fore fringes moderately long and their hind ones very long, forming fairly good corbiculæ. Hind metatarsi more than three times as long as their greatest width, with outer faces flat or nearly so and hind fringes long.

Dimensions.—Length: queen, about 17 mm.; worker, 12 mm. to 13 mm.; male, 12 mm. to 14 mm. Spread of wings: queen, about 40 mm.; worker, 27 mm. to 30 mm.; male, 31 mm. to 33 mm.

The queen is here redescribed from two specimens.

There is a worker from Costa Rica before me which apparently belongs to this species, though in coloration of pile and color of wings it is more like *volucelloides*. It does not agree with *volucelloides* in structure, but it does agree with *funebris*. It may be described as follows:

Color Variant 1.—Like typical worker, but with white patch on disc of thorax obliterated, except for a noticeable trace in front, and with apical two-thirds of third dorsal abdominal segment clothed with white

pile. With some white hairs on middle of basal margin of second segment. Wings strongly infuscate, distinctly darker than those of typical worker and with distinct violaceous reflections.

Habitat.—Bolivia (Tarata), Peru (Callanga), Ecuador (Quito, Machachi—10,000 feet, Hac. Guachala—9,217 feet, Pichincha—11,500 feet, Chillo—9,000 feet, S. Lucia—8,000 feet, Hac. S. Rosario—10,300 feet), Colombia and Costa Rica (no typical specimen from Costa Rica).

This species does not appear to have any very close allies. One might think from its color that its nearest relative was *volucelloides*, but it is structurally most like *butteli* and *baeri*. This structural likeness is seen particularly in the position of the ocelli relative to the eye margins and the supra-orbital line.

The dark pile on the head, pleura, legs, abdomen and sides of median segment of the males is nearly all tipped somewhat with pale color so as to appear somewhat cinereous. The pile of the species, as a whole, is fine and of somewhat more than medium length.

A queen, worker and male determined by Friese are before me.

Bombus (Bombias) handlirschi Friese.

Bombus handlirschi H. Friese, Zeitsch. f. Systemat. Hym. und Dipt., III Jahrg., Heft 4, July 1, 1903, p. 255, ♀ ☿ ♂.
" " Franklin, Ent. News, XVIII, 1907, p. 93, ☿.

Types.—Friese described this species from two queens, seven workers and three males. The workers and males came from Marcapata, Peru, through Staudinger, and are now in Friese's private collection as, he writes me, are also the types of all his other Neotropical species. The two queen cotypes are in the collection of the Berlin Museum and it is quite possible that they cannot be identified with certainty, as Friese, when he published the descriptions of the worker and male, appears to have described the queen inadvertently from memory.

Pile long and rather fine. Pile on head and on dorsum of thorax dark ashen gray. Pleura ferruginous. Dorsum of abdomen ferruginous at base and apex, but dark fuliginous in middle. Legs and venter of abdomen mostly ferruginous.

Queen.—This caste is unknown to me. Friese states that in coloration it is like the worker, but that it is "nearly the size of *dahlbomii*," reaching a length of 26 mm.

Worker. Head.—Of medium length. Pile on face and occiput very dark cinereous. Pile on sides of head behind eyes mostly very dark cinereous, but rather strongly ferruginous underneath toward bases of mandibles. Malar space fully as long as its width at apex, very nearly one-fourth as long as eye. Clypeus smooth and shining, rather sparsely and, for most part, very delicately punctate. Ocelli practically on supra-orbital line, above narrowest part of vertex. Third antennal segment longer than fifth, the fifth longer than the fourth.

Thorax.—Dorsum covered entirely with dark ashen gray pile. Mesopleura from level of bases of wings to bases of legs covered with ferruginous pile. Metapleura and sides of median segment also clothed with ferruginous hair.

Abdomen.—Dorsum: segment one ferruginous; segments two and three dark fuliginous, but with considerable ferruginous pile on the extreme sides and also with that color sometimes mixed in somewhat with the fuliginous in the middle; segments four and five ferruginous; segment six mostly dark, but fringed with short ferruginous hair. Venter with mostly pale ferruginous pile. Neither epipygium nor hypopygium carinate.

Wings.—Very strongly infuscate, dark for a *Bombus* worker; the fore pair with a slight violaceous reflection. Transverse median vein of fore wings usually nearly straight (not curved noticeably, as in most species of the subgenus *Bombus*) and not coalescing at base with base of discoidal, yet forming an obtuse inner angle with the median vein (but this angle is less obtuse than is usual in the subgenus *Bombus*).

Legs.—Coxæ, trochanters, femora and tibiæ all clothed almost entirely with ferruginous hair, except the anterior tibiæ often mostly dark on their front sides; corbicular fringes entirely ferruginous. Apices of hind metatarsi not drawn out into a very prominent projection behind the insertion of the second tarsal segment.

Male.—Unknown to me. Friese described this sex as follows: "male like worker, but with larger eyes; clypeus porrect. Length, 18–19 mm."

Dimensions.—Length: queen, 26 mm.; worker, 12 mm. to 15 mm.; male, 18 mm. to 19 mm. Spread of wings of worker, 28 mm. to 31 mm.

The worker is here redescribed from four specimens—three of them being the same three described by me in Entomological News, XVIII.

Habitat.—Peru (Marcapata and Callanga) and Ecuador.

Three of the workers before me are from Callanga and one is from Ecuador.

The veination of the fore wings and the formation of the apex of the hind metatarsi of the workers lead me to place this species in the subgenus *Bombias* and Friese's description of the male—"as worker, but with larger eyes"—makes me confident that I am right in doing this. The ocelli of the worker are, however, placed as in the subgenus *Bombus*.

Its closest ally is evidently *rubicundus*, from which it can be readily separated by marked differences in the coloration of its pile.

The species was named for Herr Anton Handlirsch, a bee student of Vienna.

Friese has sent me a worker of this species, from Ecuador, in good condition and determined by him.

Bombus (Bombias) rubicundus F. Sm.

Bombus rubicundus Smith, Cat. Hym. Brit. Mus., II, 1854, p. 400, n. 58, ♀.
" " Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 236.
" " Dalla Torre, Cat. Hym., X, 1896, p. 544.
" *bicolor* H. Friese, Zeitschr. für System. Hym. und Dipt., Jahrgang III, Heft 4, 1903, p. 254, ♀.

Type.—Col. C. T. Bingham found Smith's type specimen in the collection of the British Museum for me. It came from Colombia. Friese's workers came from Ecuador (Cuenca, 2200 meters altitude) and Mexico (Colon). The male is here described from two specimens (from Colombia), the cotypes of that sex, deposited in the collection of the United States National Museum and the collection of the Massachusetts Agricultural College.

Malar space short. Pile fine and rather long. Thorax entirely rufo-ferruginous. Head of queen with rufo ferruginous pile; of worker and male mostly dark. Dorsum of abdomen of queen either entirely rufo-ferruginous or partly rufo-ferruginous and partly dark fuliginous; of worker and male partly rufo-ferruginous and partly dark fuliginous; of worker sometimes mostly black. Corbicular fringes black.

Queen. Head.—Broad and rounded in form. Face, occiput and sides usually bearing little but rufo-ferruginous pile; sometimes with a strong admixture of black hairs with the red, especially on the sides

and on the occiput. Malar space much shorter than its width at apex, nearly one-seventh as long as eye. Clypeus rather coarsely and densely punctate, largely clothed with reddish pile. Ocelli rather large, placed somewhat below supra-orbital line and slightly above narrowest part of vertex, the lateral ones somewhat nearer to the margins of the eyes than to each other (transitional *Bombias* in this respect). Third antennal segment longer than fifth, the fifth longer than the fourth.

Thorax.—Clothing of dorsum, mesopleura, metapleura and sides of median segment all rufo-ferruginous.

Abdomen.—Dorsum: segment one entirely rufo-ferruginous; segments two and three usually entirely rufo-ferruginous, but sometimes darkened considerably by a strong admixture of black hairs; segment four entirely rufo-ferruginous; segment five usually entirely rufo-ferruginous, but sometimes with considerable dark fuliginous pile on sides; segment six sometimes rather strongly rufo-ferruginous, but usually mostly dark fuliginous or black. Venter dark, its pile sometimes mostly reddish and sometimes mostly dark. Hypopygium without a median carina.

Wings.—Only moderately dark, with very slight violaceous reflections.

Legs.—Coxæ, trochanters and femora all with much rufo-ferruginous pile, at least on their lower sides. Tibiæ, including the corbicular fringes, all black. Metatarsi with no long fringes.

Worker. Head.—Face bearing a mixture of ferruginous and black pile, the former being predominant. Occiput with a strong admixture of ferruginous pile with the black. Ventro-lateral sides of head dark, with ferruginous pile admixed and rather predominant. Structural characters as in queen, but with ocelli practically on supra-orbital line.

Thorax.—Coloration of pile like that of queen.

Abdomen.—Dorsum: segment one rufo-ferruginous; segments two and three with pile appearing mostly dark fuliginous (the basal portions of the hairs that make up this pile are really rufo-ferruginous while their apical portions are very dark brown); segment four mostly rufo-ferruginous; segments five and six mostly dark, but with considerable cinereous hair. Venter dark, with the apical fringes of the segments mostly rufo-fuliginous.

Wings.—Slightly lighter than those of queen.

Legs.—Much as in queen, but the femora as a rule with less reddish pile, being mostly dark except the lower sides of their basal portions.

Male. Head.—Face bearing a mixture of tawny and dark brown pile, that covering the greater part of the clypeus being almost entirely tawny. Occiput and sides of head entirely dark brown or with an admixture of tawny pile. Malar space about half as long as its width at apex. Third antennal segment somewhat longer than fifth, the fourth

shorter than either. Ocelli placed in narrowest part of vertex, at less than one-third of the distance from the supra-orbital line toward the bases of the antennæ, the lateral ones being separated from the margins of the eyes by about their own diameters. Eyes noticeably, but not greatly, swollen.

Thorax.—Coloration of pile as in queen and worker.

Abdomen.—Dorsum: segment one rufo-ferruginous; segments two and three with mostly black pile, but with a considerable admixture of rufo-ferruginous hair on their middle portions (all but the extreme sides have some reddish hairs admixed); segments four and five mostly rufo-ferruginous, but with some black pile on their extreme sides; segments six and seven mostly dark, but with more or less reddish or cinereous hair toward their sides. Venter mostly dark, but with the apical fringes of most of the segments long and mostly pale reddish or whitish in color. Hypopygium distinctly emarginate at apex.

Genitalia.—Outer spatha (fig. 152) very short and wide, the front margin being deeply incurved and the side margins rather irregularly outcurved; apical portion with an angular projection on each side, the margin between these projections being somewhat incurved; each side of the hind portion with a broad reticulated area. Inner spatha much like that of *separatus* (fig. 127), but with front margin of anterior median projection more thickly chitinized. Claspers (figs. 186 and 195) long and not very stout, the branches, as seen from dorsal side, appearing strongly quadrate at apex. Volsellæ without noticeable projections on their inner sides, except the prominent, square-ended, elongate, and rather narrow apical projections; with a large amount of hair present on nearly all portions, as seen from ventral side, this hair being very noticeably long on the outer sides of their apical portions. Squama very strongly bilobed, both lobes being unusually long and slender; the outer lobe enlarged somewhat in its apical portion and with a noticeable tooth-like projection on the outer side of this portion, but with its very apex pointed; the inner lobe elongate-triangular in form, with its round-pointed apex reaching mesad far beyond the inner margin of the volsella. Sagittæ with very long shafts, the heads reaching slightly beyond the apices of the volsellæ and having a prominent, though slender, tooth-like projection on the inner side of each, their rather narrow apices being recurved ventrad somewhat. Uncus long and only moderately broad even toward the base.

Wings.—Usually somewhat lighter than those of worker; light brown, with outer portions almost transparent.

Legs.—Coxæ, trochanters, and at least the basal portions of the femora largely clothed with cinereous or ferruginous hair (at least on their lower sides). Tibiæ all dark. Outer faces of hind tibiæ slightly convex and almost completely naked, the fringes on apical third being

rather long and forming distinct, though weak, corbiculæ. Hind metatarsi about three times as long as their greatest width.

Dimensions.—Length: queen, 17 mm. to 19 mm.; worker, 11 mm. to 13 mm.; male, 13 mm. to 15 mm. Spread of wings: queen, 41 mm. to 46 mm.; worker, 28 mm. to 31 mm.; male, about 32 mm. Width of abdomen at second segment: queen, 9 mm. to 10 mm.; worker, 6 mm. to 7 mm.; male, nearly 7 mm.

The queen is here redescribed from four specimens and the worker from two.

Variation.—Two workers (from Venezuela) before me, evidently belonging to this species, differ considerably from the typical worker in the coloration of the abdomen. These workers may be described as the following:

Color Variant.—Like typical worker, but with dorsum of abdomen all dark fuliginous, except the rufo-ferruginous pile on the anterior angles of the first segment and a considerable patch of the same color on the fourth segment; dorsum of thorax also with a noticeable admixture of very dark brown hairs, mostly between bases of wings and in front; occiput and sides of head dark fuliginous, without an admixture of ferruginous pile; face with a mixture of dark and ferruginous pile, neither color being noticeably predominant.

There is also before me a male received from H. Friese and labelled by him "*Bombus bicolor*," which varies somewhat from the typical male above described. This specimen may be described as follows:

Male Color Variant 1.—Like typical male above described, but with dorsum of thorax, between bases of wings, strongly shaded with dark pile (this dark pile being intermixed with the rufo-ferruginous pile) and with dorsum of abdomen bearing pile as follows: Segment one dark, except for some ferruginous pile admixed on anterior corners; segments two and three entirely black; segment four rufo-ferruginous in middle, but black on extreme sides; segment five black on extreme sides and in very middle, but otherwise covered with rufo-ferruginous pile; segment six almost entirely black, but with a faint sprinkling of whitish hairs on extreme sides; segment seven cinereous. The specimen was collected in Peru (Callanga).

Habitat.—We have the following valid records: Colombia, Mexico (Colon), Venezuela, Ecuador (Cuenca, about 7,000 feet altitude) and Peru. Some of the queens before me are from Colombia and some from Venezuela and the typical workers before me are from Colombia. This is a handsome

species and it resembles *dahlbomii* considerably in coloration, but the pile is of a darker, deeper red than in that species. *Rubicundus* seems to have no very close relatives among the known forms of the New World, except *handlirschi*.

Bombus (Bombias) baeri Vachal.

? *Bombus bicoloratus* Smith, Descr. New Spec. Hym., 1879, p. 132, n. 6, ♀. (Excl. patria).

" *Baeri* Vachal, Rev. Ent. France, XXIII, 1904, p. 10, ☿ ♂.

" *baeri* Friese, Flora og Fauna (Denmark), 1908, p. 92.

Types.—Vachal's specimens (two ☿'s and one ♂) are in his private collection and are given, by his testament, to the Museum of Natural History of Paris. Smith's type of *bicoloratus* may probably be identified in the collection of the British Museum. Vachal's specimens came from Argentina (Lara). The queen is here described for the first time, from seven cotypes of that caste from Puno, Peru, deposited in the collection of the Museum of Comparative Zoölogy at Cambridge.

Malar space rather short. Female ocelli placed somewhat, but not far, below the supra-orbital line. Clothing of head and thorax dark. Dorsum of abdomen entirely covered with bright coppery red pile. Legs black. Wings rather light.

Queen. Head.—With only black pile on face, occiput and sides. Malar space about as long as its width at apex, about one-fifth as long as eye. Clypeus rather strongly and evenly punctate. Ocelli rather large and placed somewhat below supra-orbital line, nearly in narrowest part of vertex; the lateral ones but slightly nearer to the margins of the eyes than to each other (transitional *Bombias* in this respect). Third antennal segment longer than fifth and fifth longer than fourth.

Thorax.—Pile black, but in some cases with a very slight coppery reflection in certain lights.

Abdomen.—Dorsum clothed entirely with bright coppery red pile, somewhat lighter toward apex. Venter mostly dark, but with a slight sprinkling, especially on lateral portions of apical margins of apical segments, of reddish hairs. Hypopygium without median carina.

Wings.—Light colored for *Bombus* queen; the basal two-thirds of the fore pair somewhat infuscate, the outer third being nearly clear transparent.

Legs.—Coxæ, trochanters, femora and tibiæ with black pile only.

Worker and Male.—These castes are unknown to me. The original description of them is as follows:

"Black, dorsum of abdomen red, the rest of the body black-haired. Head short, malar space scarcely longer than the width of the mandibles.

♀. Third antennal segment longer than the fourth and than the fifth; apex of hind metatarsi sinuate in the middle, not spinose on the angles.

♂. Facies paulo latior, oculis tumidulis, antennarum articulo 3 includentibus simul sumptis fere longiore; tibia 3 sat concava lucida; tibiæ 3 et prototarsi 3 jugo supero longe ciliato.

Length of worker, 12–13 mm.; wing, 11 mm. Length of male, 14–15 mm.; wing, 12.5 mm."

I have not here translated the description of the male from the Latin as this description does not seem to be clear in all respects.

The queens from which the description given above was made varied in length from 17 mm. to 21 mm.

Habitat.—Argentina (Lara—4,000 meters altitude), Bolivia (Tarata) and Peru (Puno). Probably also present in the northern portion of Chile.

Coccineus may be related to this species.

Smith's *bicoloratus* may have come from South America instead of from Asia. Apparently *bicoloratus* was described from a specimen in a mixed collection of South American and Asiatic specimens, as the description was given in a paper which gave the original descriptions of species from both of those continents.

The Asiatic habitat of two (*bicoloratus* and *bellicosus*) of the seven supposedly Asiatic species of *Bombus*, published by Smith in "Descriptions of New Species of Hymenoptera in the Collection of the British Museum (1879)," is now questioned because of the striking similarity of their descriptions to two strikingly and peculiarly colored South American species (*baeri* and *thoracicus*). A careful examination of the habitat of *bicoloratus* and *bellicosus*, as given by Smith, leads to interesting speculation. He gave the habitat "Sumatra or India" for *bellicosus*. The fact that he did not say definitely either Sumatra or India shows conclusively that his specimen had no locality label and that he depended either upon memory or hearsay, either one an unreliable factor in

scientific work, for his information concerning the habitat of the species. From this, we can safely say that probably Smith merely had the impression that *bellicosus* came from either Sumatra or India. He evidently had no certain knowledge concerning its habitat.

For *bicoloratus* he gives the habitat "Island of Formosa." This seems definite and may be correct. Apparently, in this case, the specimen was labelled. Definite information concerning the exact wording of that label would be interesting. Did it really read "Island of Formosa," or did it read simply "Formosa," Smith's opinion or imagination having supplied the remainder of his published habitat? If the label bore only the word "Formosa," it might have meant Formosa (Formosa Territory), Argentina instead of the Island of Formosa. It seems quite possible that specimens of *baeri* bearing the label "Formosa" and specimens of *thoracicus* without label, these two species coming as they do from the same general portion of South America, were added to the British Museum collection at about the same time (possibly also with specimens of other South American species—all perhaps having been collected by the same expedition or the same individual) and were, when in this condition, mixed up with a collection of bumble-bees from Asia, and that Smith relied largely either upon his own memory or upon that of someone else in publishing the habitat of these species as he did.

It should be noted in this connection, however, that Prof. T. D. A. Cockerell has recently recorded ("Bees in the Collection of the United States National Museum"—Proceedings United States National Museum, Vol. 39, page 642, March, 1911) *Bombus bicoloratus* from Horisha, Formosa (collected by T. Fukai).

Bombus (Bombias) butteli Friese.

Bombus butteli H. Friese, Zeitsch. f. System. Hym. und Dipt., Jahrg. III, Heft 4, July 1, 1903, p. 254, ♀.

Types.—Friese described this species from two workers which are still in his private collection. One of these speci-

mens came from Peru (Marcapata) and the other from Ecuador. The species was named for Dr. H. v. Buttel-Reepen.

Pile rather long and fine. Malar space rather short. Head and thorax with dark cinereous pile. Dorsum of abdomen ferruginous at base, dark in middle and mostly white at apex. Wings rather light. Legs mostly black.

Queen.—Unknown.

Worker. Head.—Pile on face, occiput and sides behind eyes all dark cinereous. Malar space distinctly shorter than its width at apex, about one-sixth as long as eye. Clypeus sparsely, but rather coarsely, punctate. Ocelli almost touching supra-orbital line; the lateral ones distinctly nearer to the margins of the eyes than to each other. Third antennal segment longer than fifth, the fifth longer than the fourth.

Thorax.—Dorsum, pleura and even the sides of the median segment clothed with dark cinereous pile; the very center of the disc naked, smooth and shining.

Abdomen.—Dorsum: segments one and two clothed entirely with ferruginous pile; segment three with its basal portion clothed with entirely ferruginous pile and its apical portion mostly black with a slight admixture of ferruginous hairs; segment four mostly black, but with its apical margin fringed with white hairs; segment five thinly clothed with white pile; segment six dark in middle, but thinly clothed with white pile on extreme sides. Venter mostly dark, but with the apical fringes of some of the apical segments tending to be pale. Neither epipygium nor hypopygium with median carina.

Wings.—Only moderately infuscate; the fore pair slightly lightest across their middle portions. Transverse median vein of fore wings coalescent at base for a short distance with the base of the discoidal, but, aside from this, as in *Bombus*.

Legs.—The fore coxæ, trochanters and femora, and the middle and hind coxæ and trochanters and the lower sides of the very bases of the middle and hind femora largely clothed with more or less cinereous pile; the middle and hind femora and all the tibiæ with mostly dark brown or black clothing.

Male.—Unknown.

Dimensions.—Length, about 12 mm.; spread of wings, about 27 mm.; width of abdomen at second segment, about 6 mm.

One of the specimens before me is from Bolivia (Bella Vista—Yungas), and the other two, received from Friese and determined by him, are from northern Peru (Huancabamba—9,700 feet altitude).

Possibly this species is only a variety or subspecies of *ecuadorius*. The cinereous pile of the head and thorax is

a mixture of rather long dark brown or black hairs and much shorter and finer and much more branched white or whitish pubescence or down. The ferruginous pile is perhaps better described as golden-russet in color. This species is extremely transitional in its *Bombias* characters, as those characters were originally described, but the venation of the fore wings appears to establish its position in this subgenus. The venation of the hind wings is, however, as in the subgenus *Bombus*.

One of the specimens before me (from Huancabamba, Peru) has the third dorsal abdominal segment clothed entirely with ferruginous pile and should therefore be considered a color variant.

Bombus (Bombias) coccineus Friese.

Bombus coccineus H. Friese, Zeitsch. f. System. Hym. und Dipt., Jahrg. III, Heft 4, July 1, 1903, p. 254, ♀ ♂.

Types.—Friese described this species from three workers and five males, all from Marcapata, Peru. These specimens are in his private collection.

Malar space medium. Pile of medium length and rather fine. Head and thorax black. Dorsum of abdomen with first segment black, middle segments red and apical segments white or whitish haired. Venter mostly dark. Legs black. Wings rather light.

Queen.—Unknown.

Worker. Head.—Pile entirely dark brown or black. Malar space but little shorter than its width at apex, nearly one-fourth as long as eye. Clypeus moderately punctate. Ocelli placed distinctly above narrowest part of vertex and but little below supra-orbital line, the lateral ones being placed about as far from each other as from the eye margins. Third antennal segment longer than fourth.

Thorax.—Pile all black. An area on middle of dorsum of thorax and a smaller one on front part of scutellum naked of pile.

Abdomen.—Dorsum: segment one with entirely black pile; segment two with a median patch of black pile extending longitudinally clear across it, but otherwise clothed with coccineo-ferruginous pile; segments three and four clothed with entirely coccineo-ferruginous pile; segment five mostly white, but with some black hairs; segment six mostly black, but with some white hair on extreme sides. Venter with mostly dark brown or black pile, but with some whitish hairs on last segment.

Wings.—Light, but somewhat smoky.

Legs.—Coxæ, trochanters, femora and tibiæ clothed with dark brown or black pile.

Male. *Head*.—With black pile only. Malar space very nearly as long as its width at apex, about one-fifth as long as eye (longer than that of any other *Bombias* male known to me). Clypeus largely naked, or sparsely pilose, and moderately coarsely punctate. Ocelli placed distinctly below supra-orbital line and very slightly above narrowest part of vertex; lateral ones distinctly nearer to margins of eyes than to each other, but separated from eyes by distinctly more than their own diameters. Eyes only very slightly swollen (less so than the eyes of any other *Bombias* male known to me). Third antennal segment longer than fifth; the fifth longer than the fourth.

Thorax.—Pile all black. An area on front part of middle of scutellum naked and another area on center of dorsal disc naked and mostly smooth.

Abdomen.—Dorsum: segment one black, but with a slight admixture of coccineo-ferruginous pile on extreme sides. Segment two mostly coccineo-ferruginous, but with black pile in middle; segments three and four covered with entirely coccineo-ferruginous pile; segment five mostly coccineo-ferruginous, but with a mixture of white and black hair on apical middle; segment six with some short black hairs in middle, but clothed for most part with white pile; segment seven with mostly white pile. Venter mostly black, but with apical margin of apical segment bearing a heavy fringe of short ferruginous pile.

Genitalia.—Outer spatha (fig. 155) very short and broad, with a large reticulated area on each side of the posterior portion of the ventral surface, these areas being united by reticulations running along the hind border; the front margin deeply incurved; the side margins curved inward in front and outward behind; the hind margin deeply incurved in the middle. Inner spatha much like that of *fervidus* (fig. 101), but with anterior median projection much more prominent than in that species and with hind margin of apical portion somewhat outcurved. Claspers (figs. 185 and 191) long and apparently thick and powerful; the branches, as seen from dorsal side, with moderately wide and broadly rounded apices, the ventral side of each branch having a single very noticeable branched hair rising from the bottom of a rather deep pit, this pit being located opposite the base of the volsella and well away from the margin; the volsellæ rather short in comparison with the other parts of the genitalia and unusually densely and evenly hairy over their entire surface as seen from the ventral side and without noticeable projections of any sort, except the small, elongate and rather slender apical projections; the squamæ strongly bilobed, the two lobes being about equal in size, the outer lobe being slightly the longer and the inner one somewhat the broader, the outer

one tapering to a bluntly pointed apex and with its outer dorsal face somewhat excavated and the inner one broadly rounded at the apex. Sagittæ with very long shafts, these shafts being without any noticeable projection on their middle portion and being constricted just in front of the heads; the heads reaching back nearly to the apices of the volsellæ, being considerably foliaceous in form and extending ventrad and mesad from the ends of the shafts, their outer margins being distinctly serrate. Uncus (fig. 192) at most only moderately broad, its apical portion being recurved ventrad and broadly rounded at tip.

Wings.—Only moderately infuscate, rather light. Transverse median vein of fore wings not coalescing at all at base with base of discoidal and curved somewhat so as to form a slightly obtuse inner angle with both the median and the anal vein.

Legs.—All black. Outer faces of hind tibiæ flattened, though somewhat concaved behind, and with very sparse hairs, almost completely naked, the fore fringes moderate and the hind ones long, forming distinct, though weak, corbiculæ. Hind metatarsi with outer faces flat or slightly concaved and moderately and rather evenly hairy; their hind fringes long and black; about three and one-half times as long as their greatest width.

Dimensions.—Length: worker (according to Friese), 13 mm. to 14 mm.; male (according to Friese), 16 mm. to 17 mm. (the specimen before me is between 13 mm. and 14 mm. in length).

There is a single male before me from Callanga, Peru, which I received from Staudinger. This male differs somewhat from the typical form described above, and it may be described as follows:

Male Color Variant.—Like typical male, but with first dorsal abdominal segment entirely black; second and fifth segments covered with entirely coccineo-ferruginous pile; sixth segment with mostly coccineo-ferruginous pile, but with some short black hairs in middle and with a scanty admixture of very long whitish hairs throughout; segment seven clothed with pale ferruginous pile tipped with whitish.

The typical male is here redescribed from a single specimen from Peru (Cuzco—10,400 feet to 13,600 feet altitude), received from H. Friese and labelled "*Bombus coccineus*" by him. The worker is also redescribed from a single specimen determined by Friese and received from him.

This species appears to have its closest relatives in *baeri* and *butteli*. The red pile of the specimen before me is perhaps best described as coppery-ferruginous.

South and Central American and Mexican Species of Psithyrus.

Females of only two and males of only two species of *Psithyrus* have to my knowledge been collected in the New World south of the United States. One of the males has not been heretofore described. It is closely related to *consultus* and may be a variation of that species, or it may be the male of *intrudens*. I have seen fit, however, to describe it here as new, from the single specimen before me. The two species of females may be conveniently separated from each other and from *variabilis* and *insularis*, the two United States species females of which are likely to be found in Mexico, by the following key:

Abdomen entirely black above ..... 1.
Abdomen not entirely black above ..... 2.
1. Mesopleura yellow ..... **intrudens.**
Mesopleura black ..... **variabilis.**
2. Mesopleura mostly black; third and fourth dorsal abdominal segments with white pile ..... **brasiliensis.**
Mesopleura mostly yellow; dorsum of abdomen with black and yellow pile only ..... **insularis.**

The males may be distinguished from *consultus* and the male of *variabilis*, the two United States *Psithyrus* males likely to be found in Mexico, by the following key:

Mesopleura covered with yellow pile to bases of legs ..... 1.
Lower portion of mesopleura covered with dark brown or black pile. **variabilis.**
1. Third dorsal abdominal segment clothed with yellow pile from side margin to side margin ..... **consultus.**
Third dorsal segment with black pile in middle ..... 2.
2. First dorsal abdominal segment yellow all the way across. **sololensis.**
First dorsal abdominal segment black in the middle and with a yellow tuft on each side ..... **guatemalensis.**

Psithyrus sololensis new species.

Type.—From Olas de Moka, Department Solola, Guatemala. Deposited in collection of Massachusetts Agricultural College.

Fifth antennal segment nearly equalling in length the third and fourth together. Face dark, but with some yellow pile above bases of antennæ.

Occiput with a triangular patch of yellow pile. Dorsum of thorax, except naked center of disc, clothed with yellow pile. Mesopleura yellow to bases of legs. Dorsum of abdomen with first segment yellow; the second yellow except for a dark area on each side; the third dark in the middle, especially toward the base, but yellow on the sides; the fourth black, with some yellow hair on the extreme sides; segments five, six and seven entirely dark.

Female.—Unknown.

Male. Head.—Face entirely dark, except a noticeable amount of yellow pile above bases of antennæ. Occiput largely covered with a triangular patch of pure yellow pile. Ventro-lateral portion of head entirely dark. Malar space distinctly shorter than its width at apex, about one-sixth as long as eye. Clypeus mostly covered up with black pile. Third antennal segment longer than fourth; fifth somewhat shorter than third and fourth together.

Thorax.—Dorsum with a noticeable naked area on center of disc and with a few black hairs immediately surrounding this area, but otherwise covered entirely with yellow pile. Mesopleura yellow to bases of legs. Metapleura mostly dark. Sides of median segment mostly dark, but with a slight admixture of yellow hairs on their upper portions.

Abdomen.—Dorsum: segment one entirely covered with yellow pile; segment two also yellow, but with a considerable area on each anterior corner bearing black pile; segment three with yellow pile on each side, but black in the middle, the dark area being widest on the front margin of the segment (where it is more than one-third as wide as the whole segment) and narrowest on the hind margin (where it is about one-fifth as wide as the segment); segment four black except for yellow pile on extreme sides; segments five, six and seven entirely black. Venter mostly black, but with apical margin of apical segment fringed with short ferruginous hairs.

Wings.—Rather light, only moderately infuscate.

Legs.—Mostly black.

Dimensions.—Length, about 13½ mm.; spread of wings, about 32 mm.

Psithyrus guatemalensis Ckll.

Psithyrus gualemalensis Cockerell, Ann. and Magaz. Nat. Hist., Ser. 8, X, 1912, p. 21, ♂.

I have not seen a specimen of this species, but I judge it may be closely related to *sololensis.*

Cockerell's description is as follows:

"Length about 17 mm.; anterior wing 11½.

Black, with the elongate obconical abdomen; malar space broader than long; antennæ black, the flagellum rather thick, its joints not

in the least arcuate; hair of head long and black, a little pale on lower part of front, that on top of head behind ocelli entirely very pale ochreous, but that on cheeks black; hair of thorax long and loose, very pale ochreous, a moderate amount of black on posterior middle of mesothorax and middle of scutellum, hair of hind part of pleura (especially a tuft beneath wings) and of metathorax black; tegulæ with a rufous spot posteriorly. Wings dusky, strongly reddish. Legs with black hair, that on inner side of tarsi dark red except at base; hind tibiæ slender, convex; hind basitarsi hardly as broad as tibiæ. Abdomen shining, with abundant black hair, but a large pale ochreous tuft at each side of first segment, and small yellowish-white tufts on sides of segments 3 to 5."

"Distinguished from the North American species by the colors of the pubescence; also as follows: Compared with *P. tricolor*, Franklin, it is rather less robust, and the hair of the abdomen is considerably shorter; the wings are much redder; malar space shorter (its length perhaps a trifle greater than width of mandibles at base, but in *tricolor* much greater); mandibles much more slender; third antennal joint shorter; hair of hind tibiæ and basitarsi very much shorter, mostly not longer than half diameter of leg. (The male of the European *P. quadricolor*, Lep., has even shorter hair on hind basitarsus, but long hair on the tibia. The male of the European *P. campestris* (Panz.) has the hair on hind tibia and tarsus practically as in *P. guatemalensis*.)

Hab. Guatemala City, Guatemala (*W. P. Cockerell*).

The first *Psithyrus* from Central America."

Psithyrus intrudens (F. Sm.) Handl.

Apathus intrudens Smith, Journ. of Ent., I, 1861, p. 154, n. 1, ♀.
" " Cresson, Proc. Ent. Soc. Phila., II, 1863, p. 111, n. 2, ♀.
" " Cresson, Trans. Amer. Ent. Soc., VII, 1879, p. 230 (Catal.).
Psithyrus intrudens Ant. Handlirsch, Ann. Naturh. Hofmus. Wien., III, 1888, p. 248, ♀.
" " Dalla Torre, Cat. Hym., X, 1896, p. 569.
" " Cockerell, Cat. Abej. de Mex., 1899, p. 19.

Type.—Col. C. T. Bingham failed to locate this specimen in the collection of the British Museum.

I have seen no specimen of this species. Smith's description is as follows:

"*Female*.—Black; a tuft on the vertex and another in front of the anterior stemma pale yellow; the thorax clothed above with pale pubescence, which is continued down the sides in front of the tegulæ; the thorax smooth and shining behind the scutellum; the legs with very short black pubescence; the wings fusco-hyaline. Abdomen nearly naked, shining, incurved and very acute at the apex, the margins of the segments thinly fringed with black pubescence."

"*Hab.* Oajaca, Mexico."

Handlirsch apparently had a specimen of Smith's species. He had a single specimen from Mexico (Puebla). He remarks concerning the species as follows:

"This species agrees well with *insularis* in the plastic characters, but is considerably smaller, 18 mm. The wings are rather strongly infuscate, the thorax and the upper half of the head is yellow, all the remainder is black haired. The callosities on the underside of the sixth segment are somewhat less sharply impressed than in *insularis*."

This species appears to be much like *laboriosus* in coloration, and it probably belongs to the *Laboriosus* Group.

Psithyrus brasiliensis (F. Sm.) D. T.

Apathus brasiliensis Smith, Cat. Hym. Brit. Mus., II, 1854, p. 385, n. 8, ♀.

Psithyrus brasiliensis Dalla Torre, Cat. Hym., X, 1896, p. 566.

Type.—Smith's specimen was located for me in the collection of the British Museum by Col. C. T. Bingham.

I have never seen this species. Smith's description is as follows:

"*Female*.—Length 7 lines. Black; head subrotundate, the face clothed with black pubescence, that on the vertex mixed with a few yellow hairs. Thorax clothed anteriorly with long yellow pubescence; the disc shining, thinly covered with black hairs; the metathorax, the sides and beneath have also a black pubescence; the wings subhyaline, their nervures ferruginous. Abdomen shining, the base thinly clothed with black pubescence; on the third and fourth segments it is white, but on the apical ones it is black; the apical segment incurved, nearly naked and acute."

"*Hab.* Brazil (Para)."

While this seems to be a true *Psithyrus*, I doubt if it was ever taken in Brazil, for the following reasons:

1. The original description mentions white pubescence on the third and fourth segments of the abdomen. The loca-

tion and climate of Para, Brazil, does not call for pile of that color on any species of the family Bombidæ.

2. No species of *Bombus* at all similarly colored has ever been reported from Brazil.

3. No other really tropical species of *Psithyrus* has ever been captured in the New World. *Intrudens*, *sololensis* and *guatemalensis* came, to be sure, from the tropics, but the first of these species inhabits a mountainous region of Mexico and the two latter live in the high mountains of Guatemala, so they must be considered Lower Austral rather than Tropical forms.

Unclassified Names and Descriptions.

Such names and descriptions are here brought together as the writer has been unable to place with certainty, and it is hoped that, if any of them can be made to apply satisfactorily, some future worker on this family of insects may be helped by their being collected here.

Bombus antiguensis F.

Apis antiguensis Fabricius, Syst. Ent., 1775, p. 380, n. 11.
" " Fabricius, Spec. Insect., I, 1781, p. 476, n. 12.
" " Fabricius, Mant. Insect., I, 1787, p. 300, n. 12.
" " Olivier, Encycl. Méthod. Insect., IV, 1789, p. 66, n. 24.
" " Gmelin, Linné: Syst. Nat., Ed. 13, I, 5, 1790, p. 2784, n. 115.
? " " Christ, Naturg. d. Insect., 1791, p. 126.
" " Fabricius, Ent. Syst., II, 1793, p. 318, n. 16.
Bombus antiguensis Fabricius, Syst. Piez., 1804, p. 346, n. 15.
" " Illiger, Magaz. f. Insectenk., V, 1806, p. 171, n. 42.
Bremus antiguensis Jurine, Nouv. Méth. Class. Hym., 1807, p. 260, ♀.
Xylocopa antiguensis Lepeletier, Encycl. Méthod. Insect., X, 1825, p. 794.
Bombus antiguensis Smith, Cat. Hym. Brit. Mus., II, 1854, p. 397, n. 38.
" " Cresson, Proc. Ent. Soc. Phila., II, 1863, p. 107, n. 40.
" " Cresson, Trans. Amer. Ent. Soc., VII, 1879, p. 230 (Catal.).
" " Dalla Torre, Cat. Hym., X, 1896, p. 510.

Bombus antiguensis Shulz, Separat. Abdruck. aus den Sitzungle-richten der Mathem.—phys. Klasse der Kgl. Bayer Akad. der Wissensch., XXXIII, 1903, H. III, p. 453.

The description given by Fabricius is as follows :

"Size of *A. violaceus*. Head black, immaculate. Thorax hairy, black. Abdomen black, anterior part yellow. Wings fuscus. Feet black."

"*Hab.* Antigua."

This species does not seem to have been a *Bombus*. It probably belonged to *Xylocopa* or some other genus. Is the type specimen in existence? Herr W. A. Shulz (in the reference given in the list of synonymy) in criticising the statements made by Friese and others, that certain Hymenopterous genera, *Bombus* included, are not present on the Greater Antilles islands, cites this species from Antigua, among others, as casting doubt on the accuracy of those statements. Should this extremely uncertain record have much weight in such a discussion?

Bombus alatus F.

Apis alata Fabricius, Suppl. Entom. Syst., 1798, p. 274, n. 43 and 44.
Bombus elatus Fabricius, Syst. Piez., 1804, p. 352, n. 49.
" " Illiger, Magaz. f. Insectenk., V, 1806, p. 171, n. 41.
" " Illiger, Magaz. f. Insectenk., V, 1806, p. 174, n. 62.

The description given by Fabricius is as follows :

"A. hirta flavescens capite anoque nigris.
Habitat in America boreali.
Statura praecedentis" (= *B. fervidus*) "at thorax immaculatus."

I am of the opinion that *fervidus* was originally described from a worker and that *alatus* was the same as the *Apathus citrinus* (= male of *P. laboriosus*) of Smith, which might easily be of the same size as a worker of *fervidus*. No other species of the North American *Bombidæ* to my mind answers the description so well. The description, however, is very meager, and the species must remain in doubt unless the type of Fabricius is sometime discovered and recognized.

It is impossible to say what the *Apathus elatus* of Bowles (Ann. Rep't Ent. Soc. Ont., 1880, p. 33) was. It may have been *P. insularis* F. Sm. Bowles gave no description of it, only the habitat record "3 females; Montreal."

Bombus marylandicus F.

Apis marylandica Fabricius, Suppl. Entom. Syst., 1798, p. 273, n. 20–21.

Bombus marylandicus Fabricius, Syst. Piez., 1804, p. 346, n. 19.
" " Illiger, Magaz. f. Insectenk., V, 1806, p. 172.
" " Cresson, Proc. Ent. Soc. Phila., II, 1863, p. 90, n. 3.
" " Dalla Torre, Cat. Hym., X, 1896, p. 532.

The original description of this species is as follows:

"Large. Head black, labium ferruginous. Antennæ black, first segment ferruginous. Thorax hairy, ferruginous. Abdomen hairy, black, second segment yellow. Posterior legs very hairy. Wings blackish-violaceous. Habitat America."

Unknown to me. It probably does not belong to the Bombidæ.

Bombus napensis Spin.

Bombus napensis Spinola, Osculati: Explor. Reg. Equat., 1850, p. 201, n. 23, ♂ (nom. nud.).
" " Spinola, Osculati: Explor. Reg. Equat., 1854, p. 203, n. 23, ♂ (nom. nud.).
" " Dalla Torre, Cat. Hym., X, 1896, p. 537 (nom. nud.).

Bombus ornatus F. Sm.

Bombus ornatus Smith, Cat. Hym. Brit. Mus., II, 1854, p. 398, n. 52, ♀ ☿ ♂.
" " Cresson, Proc. Ent. Soc. Phila., II, 1863, p. 104, n. 33, ♀ ☿ ♂.
" " Cresson, Trans. Amer. Ent. Soc., VII, 1879, p. 231 (Catal.).
" " Syn. Hym. No. Amer., 1887, p. 308 (Catal.).
" *ternarius* var. *ornatus* Dalla Torre, Cat. Hym., X, 1896, p. 553.

The original description is as follows:

"*Female.* Length 7 lines. Black; the pubescence on the head black, mixed with yellow hairs at the insertion of the antennæ; the thorax has a rich fulvo-ochraceous pubescence, and has a broad black band between the wings, the sides of the thorax anteriorly yellow; the legs have a black pubescence, with a few pale hairs at the base of the femora beneath; wings fusco-hyaline. Abdomen, the pubescence on the basal segment yellow, on the three following segments it is fulvous, having a narrow border of yellow, which divides it from the black pubescence which clothes the apex.

The coloring of the male and the worker is the same, but less bright and the pubescence is longer in the male than in the other sexes."

"*Hab.* North America; Hudson Bay; Arctic America."

This species may have been *ternarius*, *sylvicola*, or even possibly *melanopygus*.

Col. C. T. Bingham failed to locate Smith's type specimen of this species for me.

Bombus (?) parvulus F.

Bombus parvulus Fabricius, Syst. Piez., 1804, p. 352, n. 53.
" " Illiger, Magaz. f. Insectenk., V, 1806, p. 172.
" " Dalla Torre, Cat. Hym., X, 1896, p. 539.
" " Franklin, Ent. News, XVIII, 1907, p. 92.

The original description is as follows:

"Of the general size of this genus, but small. Head with black antennæ. Thorax hairy, sometimes cinereous, sometimes ferruginous. Abdomen naked, dark and shining. Feet ferruginous. *Hab.* South America."

This description makes me believe that this species belongs to *Xylocapa*. Is the type still extant?

Bombus praticolus Kirby.

Bombus praticola W. Kirby, Fauna Bor.-Amer., IV, 1837, p. 274, n. 381, ♀.
" " Cresson, Proc. Ent. Soc. Phila., II, 1863, n. 36, ♀.
" " Bethune (Reprint W. Kirby's Faun. Bor.-Amer.), Can. Ent., X, 1878, p. 118, ♀.
" " Cresson, Trans. Amer. Ent. Soc., VII, 1879, p. 231 (Catal.).
" " Cresson, Syn. Hym. North America, 1887, p. 308 (Catal.).
" *praticolus* Dalla Torre, Cat. Hym., X, 1896, p. 541.

The original description is as follows:

"♀. Body black, clothed above with yellowish hair. Head with a tuft of yellowish hairs below the antennæ, and on the vertex; thorax black between the wings, which are embrowned; legs with yellow hairs at the base; anterior half of the abdomen yellow, posterior ferruginous. Length of body 7 lines. Taken in Lat. 65°."

From this description it seems most probable that the species was either *flavifrons* or *pleuralis*.

Bombus (Bombus?) rubriventris Lep.

Bombus rubriventris Lepeletier, Hist. Nat. Insect. Hymen., I, 1836, p. 472, n. 23, ♀.
" " Smith, Cat. Hym. Brit. Mus., II, 1854, p. 401, n. 65.
" " Dalla Torre, Cat. Hym., X, 1896, p. 544.

Type.—St. Fargeau's specimen is probably lost.

I have seen no *Bombus* specimen which I could consider as representing this species. *B. carolinus* comes nearest to it and St. Fargeau probably made his description from a freak specimen of that species. St. Fargeau's description is as follows:

"Black. Thorax entirely covered with short hairs of a grayish white color, mixed with some black hairs. Dorsum of abdomen having the first segment black; the second, third and fourth red; the fifth and the anus black. Legs and tarsi completely blackish red; their pile black above, reddish beneath. Wings dark, with a violaceous reflection. Queen, eleven lines in length."

"*Note.* If the pile of the thorax had been black, I should have taken it for the *Bombus carolinus* of authors.

Brazil. Museum of Dejean."

Bombus semivetulus Spin.

Bombus semivetulus Spinola, Osculati: Explor. Equat., 1850, p. 201, n. 24, nom. nud.
" " Spinola, Osculati: Explor. Equat., 1854, p. 203, n. 24, nom. nud.
" " Dalla Torre, Cat. Hym., X, 1896, p. 546, nom. nud.

Eurasian Species belonging to American Groups of Bombus and Psithyrus established in this paper.

Genus **PSITHYRUS.**

1 Fernaldæ Group.
globosus Eversmann.
lissonurus (Thomson).
quadricolor Lep.

2. Ashtoni Group.
vestalis (Fourcr.).

I have examined the genitalia of a male determined by Schmiedeknecht and find that they differ but little from those of *ashtoni* and *sculkleyi*.

3. Laboriosus Group.

Not certainly known to be represented in the Old World.

4. Other Groups.

Campestris (Panz.) and *barbutellus* (Kirby) represent two distinct groups not found in the New World, and *rupestris* (F.) apparently represents a third, though that species seems to show some affinities, in its male genitalia, with the species of the *Laboriosus* Group.

Genus **BOMBUS.**

A. Subgenus *Bombias*.

1. Auricomus Group.

Not certainly known to be represented in the Old World, but, as the species *nevadensis* probably ranges through Alaska, the chances seem good that the group is present in Asia at least. *Vorticosus*, as described and figured by Schmiedeknecht (Apid. Europ., I, P. 5, 1883, p. 319, n. 11, ♀ ☿ ♂; T. 8, Fig. 7), appears to be rather closely related to the species of this group and it may really belong to it.

2. Fraternus Group.

Not certainly known to be represented in the Old World. *B. morawitzi* Rad. has the male genitalia of this group, but I know little about the species otherwise. *B. vorticosus* Gerstaecker, if the figures of Radoszkowski (Bull. Soc. Natural. Moscou, LIX, 1884, p. 67, F. 11) are correct, also has male genitalia nearly typical of this group, but Radoszkowski describes nothing but the genitalia and, as figured by him, they are certainly much different from those figured and described by Schmiedeknecht (Apid. Europ., I, P. 5, 1883, p. 319, n. 11, ♀ ☿ ♂; T. 8, Fig. 7) as those of *vorticosus*.

I have examined the genitalia of the male of *mastrucatus* Gerstaecker (the genitalia which I examined being those of a male determined by Schmiedeknecht), and I found them to be like those of the *Fraternus* Group. Furthermore, the hind metatarsus of the male of that species has a good fringe of long hairs on its hind border as it does in the species of this group. The eyes and the ocelli, however, are, in all the castes, as in the subgenus *Bombus*. Moreover, the mandi-

bles of the females (I have examined those of a worker determined by Schmiedeknecht and found them to be as described and figured by him in Apid. Europ., I, P. 5, 1883, p. 373; T. 12, Fig. 2) are distinctly six-toothed. I know of no other species of *Bombus* normally with more than four distinct teeth to the mandible, and Schmiedeknecht (vide supra) states that *mastrucatus* may be readily distinguished from all other species of bumble-bees by means of the toothed mandibles of its females. Is not this remarkably specialized structure of the mandibles due to some peculiar specialization on the part of this species in its habits of nest building?

The genitalia of the male of *alpigenus* Morawitz, as figured by Radoszkowski under the name *wurfleini* (Bull. Soc. Natural. Moscou, LIX, 1884, p. 65; T. 1, Fig. 9), would place that species in this group, but I know nothing of its other characters. Schmiedeknecht (Apid. Europ., I, P. 5, 1883, p. 373) placed *alpigenus* as a variety of *mastrucatus*.

3. Other Groups.

B. vorticosus Gerstaecker (as described and figured by Schmiedeknecht in Apid. Europ., I, P. 5, 1883, p. 319, n. 11, ♀ ☿ ♂; T. 8, Fig. 7), *mendax* Gerstaecker (as described and figured by Schmiedeknecht in the same work), and *confusus* Schenck all belong to the subgenus *Bombias*. I have seen a worker of *mendax*, determined by Schmiedeknecht. Its ocelli were placed distinctly below the supra-orbital line, but slightly above the narrowest part of the vertex, the lateral ones being nearer to the margins of the eyes than to each other. I have seen specimens (determined by Schmiedeknecht) of all three castes of *confusus* and have examined the genitalia of the male. Many of the characters of this species, if other characters were not considered, would place it readily in the *Fraternus* group. The ocelli of the females are large and placed in the narrowest part of the vertex, well below the supra-orbital line, the lateral ones being nearer to the margins of the eyes than to each other; the eyes of the male are greatly swollen and the ocelli are placed in the narrowest part of the vertex, at about one-third of the dis-

tance from the supra-orbital line toward the bases of the antennæ, the lateral ones being separated from the margins of the eyes by less than their own diameter; the hind metatarsi of the male have fringes of long hairs on their posterior borders. On the other hand, however, the clypeus of the queen and worker is finely and evenly punctate over its entire surface as with the species of the *Auricomus* group, and the third antennal segment of the male is nearly equal in length to the fourth and fifth taken together.

Vorticosus may belong to the *Auricomus* group or it may represent a group not found in the New World.

From Schmiedeknecht's figure of the male genitalia of *mendax* and from my own examination of the genitalia of *confusus*, I am sure that those two species represent two groups not present in the New World. The *Confusus* group seems more nearly allied to the *Auricomus* group than to the *Fraternus* group.

B. Subgenus *Bombus*.

1. Dumoucheli Group.
   dumoucheli Rad., from southern Siberia (Irkutsk and Nerchinsk).

2. Pratorum Group.
   alticola Kriechbaumer.
   ? *consobrinus* Dahlbom.
   haematurus Kriechbaumer.
   hypnorum (L.).
   lapponicus (F.).
   ? *modestus* Eversmann.
   pratorum (L.).
   jonellus Kirby.
   ussurensis Rad.

I have examined the male genitalia of *lapponicus* (taken from a specimen determined by Schmiedeknecht). As the descriptions and figures, given by Radoszkowski (Bull. Soc. Natural. Moscou, LIX, 1884, pp. 59–62 and plates) and Schmiedeknecht (Apid. Europ., I, P. 5, 1883), of the genitalia of the males of *alticola*, *haematurus*, *hypnorum*, *pratorum*, *jonellus* (= *scrimshiranus*) and *ussurensis* agree, I have no hesitation in placing these species in this group. *Consobrinus* and *modestus*, if Radoszkowski (Bull. Soc. Natural.

Moscou, LIX, 1884, pp. 59–61) is correct, also belong certainly to this group, though I have no evidence to show that this is so, aside from Radoszkowski's opinion. There are probably still other species in the Old World, with the characters of which I am not familiar, which belong to this group. I have examined the male genitalia of *lapidarius* (taken from a specimen determined by Schmiedeknecht) and find that, in many respects, they resemble closely those of the species of the *Pratorum* group. Each squama, however, has a distinct, though not very well developed, inner lobe, and the head of each sagitta extends mesad in a long spine-like projection, but is not falcate. I am inclined to consider this structure of the genitalia as representing, in a large measure, the very primitive structure of the genitalia of the *Pratorum* group. It should be noticed that Radoszkowski (Bull. Soc. Natural. Moscou, LIX, 1884, p. 62) made *lapidarius* the typical species of a group in which he also placed *caucasicus* Rad. and *eriophorus* Klug.

3. KIRBYELLUS GROUP.
alpinus (L.).
hyperboreus Schönherr.
balteatus (= *nivalis*) Dahlbom.

These three species have been placed in this group by means of Schmiedeknecht's descriptions (Apid. Europ., I, P. 5, 1883) of them, particularly by his descriptions of their male genitalia.

4. BOREALIS GROUP.
distinguendus Morawitz.
? *fragrans* (Pallas).
latreillellus (Kirby).

I have seen specimens of both *distinguendus* and *latreillellus* labelled by Schmiedeknecht and have examined the male genitalia of the latter species. The figures of the genitalia of both these species, given by Radoszkowski (Bull. Soc. Natural. Moscou, LIX, 1884) and Schmiedeknecht (Apid. Europ., I, P. 4, 1882), agree very well and indicate that they are much like the genitalia of *borealis* and *appositus*. The figure of the male genitalia of *fragrans*, given by Sch-

miedeknecht (Apid. Europ., I, P. 5, 1883; T. 11, Fig. 4), would place that species at once in this group, and Schmiedeknecht's description of the species as a whole seems to indicate that it is in general much like the species known to belong in this group. The figures, given by Radoszkowski (Bull. Soc. Natural. Moscou, LIX, 1884, Tab. IV, figs. 36 a, b and c), however, as those of the male genitalia of *fragrans*, represent genitalia quite different from those figured by Schmiedeknecht as belonging to that species. The standing of *fragrans* is, therefore, in doubt, but with the chances in favor of its belonging to the *Borealis* group.

5. Terrestris Group.

fairmairi Sichel. (From Kunawar, India).
portchinski Rad. (From Caucasus).
terrestris (L.).

I have placed *fairmairi* and *portchinski* in this group by the descriptions and figures of their male genitalia given by Radoszkowski (Bull. Soc. Natural. Moscou, LIX, P. I, 1884, pp. 80 and 82; T. 3, Figs. 31 and 33).

6. Other Groups.

There are several distinct Old World groups belonging to the subgenus *Bombus*, which are not present in the New World. I have been able to distinguish at least six such groups, as follows:

(a). Hortorum Group.

Including *hortorum* (L.) and *argillaceus* (Scopoli) and perhaps other species. I examined the genitalia of a male *hortorum*, determined by Schmiedeknecht, and found them to be as figured by Radoszkowski and Schmiedeknecht.

(b). Soroeensis Group.

Including *soroeensis* (F.) and *radoszkowskyi* D. T. (= || *perplexus* Rad.) and possibly other species. I examined the genitalia of a male *soroeensis*, determined by Schmiedeknecht, and found them to be as figured by Radoszkowski and Schmiedeknecht. I have never seen a specimen of *radoszkowskyi*, but follow Radoszkowski in placing it in this group, as his figures indicate that the male genitalia are much like those of *soroeensis*.

(c). Sylvarum Group.

Including *sylvarum* (L.), *equestris* (F.) (= *arenicola* Thomson ?), *molkosewitsi* Rad. and possibly other species. I have seen no specimen of this group, but Radoszkowski's figures of the male genitalia of these three species (Bull. Soc. Natural. Moscou, LIX, 1884, pp. 73 and 74; Tab. II, Figs. 20, 21 and 22) are enough to make it certain that they represent a group distinct from all the others known to me. Radoszkowski's figures seem to indicate that these species are more primitive than any of the New World species.

(d). Pomorum Group.

Including *pomorum* Panzer, *mesomelas* Gerstaecker and possibly other species. I examined the genitalia of a male *pomorum* determined by Schmiedeknecht and found them to be as figured by Schmiedeknecht and Radoszkowski. I have included *mesomelas* in this group because Radoszkowski's figures of the genitalia of that species (Bull. Soc. Natural. Moscou, LIX, 1884; Tab. II, Figs. 19 a, b and d) represent genitalia much like those of *pomorum*.

This group is closely allied to the *Dumoucheli* group.

(e). Diversus Group.

Including *diversus* and possibly other species. I establish this group entirely on Handlirsch's figure (Ann. Naturh. Hofmus. Wien., III, 1888, p. 214; T. 10, Fig. 10) of the male genitalia of *diversus*. *Diversus* is from Japan and appears to have rather close affinities with the *Dumoucheli* group.

(f). Tristis Group.

Judging by the figures given by Radoszkowski (Bull. Soc. Natural. Moscou, LIX, 1884, p. 75), this group, as established by him, is valid, though it evidently has rather close affinities with the *Dumoucheli* group.

Judging by Radoszkowski's figures (ibid., Tab. IV, Figs. 37, a and b) of the male genitalia of *stevenii* (= *zonatus* var. ?), that species should have also been included in the *Tristis* group.

If the figures of the male genitalia of *agrorum* (F.) given by Schmiedeknecht (Apid. Europ., I, 1883) and Radoszkowski (Bull. Soc. Natural. Moscou, LIX, 1884) are correct, that species probably represents still another group not found in the New World.

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Catalogue of Lettering of Plates.

A or a, anal.
ac, anterior coxa.
am, apical margin.
AP or ap, median basal plate.
ap1, first apical cell.
ap2, second apical cell.
B, branch or stipes.
BB, bulb.
bv, basal vein.
C, cardo.
CL, clasper.
CP, connecting piece.
cs, clypeus.
CT or ct, costal.
cu, cubital.
cu1, first cubital cell.
cu2, second cubital cell.
cu3, third cubital cell.
cu4, fourth cubital cell.
d, discoidal vein.
d1, first discoidal cell.
d2, second discoidal cell.
d3, third discoidal cell.
e, mesothorax.
e1, mesonotum (scutum).
e2, scutellum.
e3, mesothoracic episternum.
e4, mesothoracic epimeron.
f, fenestra.
ff, frenal fold.
fh, frenal hooks.
FL, flagellum.
fr, frons.
fw, fore wing.
G, sheath plates.
H, head of sagitta.
hw, hind wing.
i, inner spatha.
l, labrum.
M or m, median vein or median cell.
MA, muscle attachment.
mc, mesocoxa.
md, median cell.
ml, malar space.
MR, metatarsus.
MU or mu, muscles.
n, metathorax.
n1, metanotum.
n2, metapleuron.
n3, metapleuron.
NX, nux.
O, outer spatha.
oc, occiput.
P, prothorax.
P1, proscutum.
P2, proscutellum.
P3, pronotal lobe.
par, parapsidal grooves.
pc, posterior coxa.
PD, pedicel.
PI, sting palpi.
pm, posterior margin.
PR, apical projection of volsella.
PS, pulvillus.
pt, antennal pits.
R, roots of sting.
rel, first recurrent vein.
re2, second recurrent vein.
rr, radial.
S, sagitta.
sa, stigma.
SB or sb, subcostal vein.
SC or sc, basal portion of subcosta.
sd, subdiscoidal vein.
SE, scape.
SH, palpus bearing sheath plate.
si, sinus.
sm, submedian cell.
sp, spiracle.
SS, spur or spurs.
ST, sting.
T, squama.
T1, first tooth.
T2, second tooth.
T3, third tooth.
T4, fourth tooth.

TA, tibia.
tc, transverse cubital vein.
tc1, first transverse cubital vein.
tc2, second transverse cubital vein.
tc3, third transverse cubital vein.
tg, tegula.
tm, transverse median vein.
tr, trachea.
U, uncus.
V, volsella or lacinia.
ver, vertex.
W, median segment.
X, membrane of squama.
Y, shaft of sagitta.
1–6, abdominal plates.

Explanation of Plates.

The figures on plates two to four inclusive and figure 53 on Plate VIII were prepared, by tracing, from photographs. All the other figures, except those on Plate I, are camera lucida drawings. The plates are all by the author, except XIX and XXI, which were prepared by Miss Iris L. Wood of St. Anthony Park, Minnesota, from outlines made by the author.

PLATE I.

FIG. A.—*Psithyrus laboriosus* (Fabricius). Outer view of right posterior tibia of female. x5.

" B.—*Bombus* (*Bombias*) *fraternus* (Smith). Outer view of right posterior tibia of queen. x5.

" C.—*Bombus impatiens* (Cresson). Ventro-lateral view of abdomen of queen. x5.

" D.—*Bombus* (*Bombias*) *fraternus* (Smith). Front view of head of queen. x5.

" E.—*Bombus pennsylvanicus* (Deeger). Front view of head of queen. x5.

" F.—*Bombus pennsylvanicus*, front view of head of male. x5.

" G.—*Bombus* (*Bombias*) *auricomus* Robertson. Front view of head of male. x5.

" H.—*Psithyrus latitarsus* Morrill. Ventro-lateral view of abdomen of female. x5.

" I.—*Psithyrus laboriosus*. View of outer side of right posterior metatarsus of female. x5.

" K.—*Bombus affinis* Cresson. View of outer side of right posterior metatarsus of queen. x5.

PLATE II.

FIG. 1.—*Bombus impatiens*, side view of body of queen. x5.

" 2.—*Bombus impatiens*, dorsal aspect of thorax of queen.

PLATE III.

FIG. 3.—*Bombus vagans* Smith. Fore wing of queen with the cells named according to the nomenclature of Comstock and Needham. x5.

" 4.—*Bombus affinis* Cresson. Hind wing of queen with the cells named according to the nomenclature of Comstock and Needham. x5.

" 5.—*Bombus vagans*, fore wing of queen with the cells named according to the usual (Cresson's and others) nomenclature. x5.

" 6.—*Bombus affinis*, hind wing of queen with the cells named according to the usual (Cresson's and others) nomenclature. x5.

PLATE IV.

FIG. 7.—*Bombus vagans*, fore wing of queen with the veins named according to the nomenclature of Comstock and Needham. 5x.

" 8.—*Bombus affinis*, hind wing of queen with the veins named according to the nomenclature of Comstock and Needham. x5.

" 9.—*Bombus vagans*, fore wing of queen with the veins named according to the usual (Cresson's) nomenclature.

" 10.—*Bombus affinis*, hind wing of queen with veins named according to the usual nomenclature.

PLATE V.

FIG. 11.—*Bombus* (*Bombias*) *fraternus*, ventral aspect of outer spatha of male. x13.

" 12.—*Bombus perplexus* Cresson. Inner aspect of end of right posterior tibia of worker. x25.

" 13.—*Bombus vagans*, bulla in second transverse-cubital vein of fore wing. x60.

" 14.—*Bombus* (*Bombias*) *nevadensis* Cresson, part of veination of fore wing of worker. x13.

" 15.—*Bombus* (*Bombias*) *auricomus*, part of veination of hind wing of queen. x13.

" 16.—*Psithyrus interruptus* (Greene). Sting, with connected parts. x13.

" 17.—*Bombus pennsylvanicus*, outline of some of the middle segments of flagellum of antenna of male. x13.

" 18.—*Bombus pennsylvanicus*, hair from abdomen of queen. x60.

" 19.—*Bombus mixtus* Cresson. Antenna of male. x13.

" 20.—*Bombus vagans*, antennal comb on fore leg. x30.

PLATE VI.

FIG. 21.—*Bombus perplexus*, antenna of male. x13.

" 22.—*Bombus* (*Bombias*) *fraternus*, inner spatha of male. x13.

" 23.—*Bombus ternarius* Say. Lateral aspect of antenna of male. x13.

" 24.—*Psithyrus interruptus*, spiracle bearing plate of abdomen. x13.

" 25.—*Bombus appositus* Cresson. Flagellum of antenna of male. x13.

" 26.—*Bombus pennsylvanicus*, tarsal claws of queen. x25.

" 27.—*Bombus affinis*, antenna of worker. x13.

" 28.—*Bombus ternarius*, inner (dorsal) aspect of apical ventral abdominal segment of worker. x13.

" 29.—*Bombus pennsylvanicus*, hair from thorax of queen. x60.

" 30.—*Bombus* (*Bombias*) *nevadensis*, inner aspect of left mandible of worker. x13.

" 31.—*Bombus* (*Bombias*) *morrisoni* Cresson. Ventral aspect of outer spatha of male. x13.

" 32.—*Bombus sonorus* Say. Dorsal aspect of inner and outer spathas together. x13.

PLATE VII.

FIG. 33.—*Bombus affinis*, view of inner side of left mandible of male. x17.

" 34.—*Bombus affinis*, view of inner side of right mandible of queen. x17.

" 35.—*Bombus* (*Bombias*) *morrisoni*, outline of inner aspect of right mandible of male. x20.

" 36.—*Bombus bimaculatus* Cresson. Outline of inner aspect of right mandible of worker. x17.

" 37.—*Bombus affinis*, outline of inner aspect of left mandible of worker. x17.

" 38.—*Bombus* (*Bombias*) *fraternus*, outline of inner aspect of left mandible of male. x13.

" 39.—*Bombus affinis*, outline of inner aspect of right mandible of worker. x17.

" 40.—*Bombus affinis*, outline of inner aspect of right mandible of worker. x17.

" 41.—*Bombus affinis*, outline of inner aspect of left mandible of worker. x17.

" 42.—*Bombus ternarius* Say. Outline of inner aspect of left mandible of queen. x17.

" 43.—*Psithyrus interruptus*, inner (dorsal) aspect of apical ventral abdominal segment of female. x9.

" 44.—*Bombus vagans*, outline of inner aspect of right mandible of queen. x17.

FIG. 45.—*Bombus perplexus*, outline of inner aspect of left mandible of queen. x17.

" 46.—*Psithyrus interruptus*, outline of inner aspect of right mandible of female. x17.

" 47.—*Bombus perplexus*, outline of tegula of queen. x11.

" 48.—*Psithyrus latitarsus*, outline of inner aspect of end of right posterior tibia of female. x17.

" 49.—*Psithyrus latitarsus*, outline of inner aspect of right mandible of female. x17.

" 50.—*Bombus dahlbomii* Guérin. Side piece connected with sting sheath of female. x9.

" 51.—*Bombus perplexus*, outline of labrum of male. x17

" 52.—*Bombus vagans*, base of fore wing of queen. x20.

PLATE VIII.

FIG. 53.—*Bombus* (*Bombias*) *fraternus*, head of queen. x5.

" 54.—*Psithyrus tricolor*, new name. Ventral aspect of outer spatha of male. x26.

" 55.—*Bombus* (*Bombias*) *rufocinctus* Cresson. Inner spatha of male. x26.

" 56.—*Bombus sp.* Spots on an area of sensitive portion of antenna. x360.

" 57.—*Psithyrus laboriosus*, outline of labrum of male. x26.

" 58.—*Bombus affinis*, lateral aspect of tip of antenna of worker. x26.

" 59.—*Psithyrus variabilis* (Cresson). Inner spatha of male. x26.

" 60.—*Psithyrus ashtoni* (Cresson). Ventral aspect of outer spatha. x26.

PLATE IX.

FIG. 61.—*Bombus borealis* Kirby. Ventral aspect of left side of genitalia of male. x20.

" 62.—*Bombus impatiens*, ventral aspect of end of clasper of male. x20.

" 63.—*Bombus kirbyellus* Curtis. Ventral aspect of right side of genitalia of male. x17.

" 64.—*Bombus vagans*, dorsal aspect of right side of genitalia. x20.

" 65.—*Bombus ternarius*, dorsal aspect of left side of genitalia. x20.

" 66.—*Bombus pennsylvanicus*, dorsal aspect of left side of genitalia. x20.

" 67.—*Bombus vagans*, ventral aspect of right side of genitalia x20.

" 68.—*Bombus borealis*, dorsal aspect of left side of genitalia. x20.

" 69.—*Bombus perplexus*, dorsal aspect of end of right clasper. x20.

" 70.—*Bombus pennsylvanicus*, ventral aspect of right side of genitalia. x20.

PLATE X.

FIG. 71.—*Bombus* (*Bombias*) *fraternus*, ventral aspect of left side of genitalia. x17.

" 72.—*Bombus impatiens*, dorsal aspect of end of left clasper. x20.

" 73.—*Bombus* (*Bombias*) *nevadensis*, ventral aspect of right side of genitalia. x20.

" 74.—*Bombus fernaldi*, new name. Dorsal aspect of end of left clasper. x20.

" 75.—*Psithyrus laboriosus*, ventral aspect of base of genitalia with spathas removed. x20.

" 76.—*Bombus perplexus*, ventral aspect of end of right clasper. x20.

" 77.—*Bombus kirbyellus*, dorsal aspect of left clasper of male. x17.

" 78.—*Bombus californicus* Smith. Dorsal aspect of end of left clasper. x20.

" 79.—*Bombus* (*Bombias*) *rufocinctus*, ventral aspect of right side of genitalia. x20.

" 80.—*Bombus* (*Bombias*) *fraternus*, head of sagitta of genitalia. x40.

" 81.—*Bombus* (*Bombias*) *crotchii* Cresson. Ventral aspect of right side of genitalia. x20.

PLATE XI.

FIG. 82.—*Bombus* (*Bombias*) *nevadensis*, dorsal aspect of left clasper. x20.

" 83.—*Bombus* (*Bombias*) *auricomus*, dorsal aspect of left side of genitalia. x20.

" 84.—*Bombus* (*Bombias*) *rufocinctus*, dorsal aspect of left side of genitalia. x20.

" 85.—*Bombus* (*Bombias*) *separatus* Cresson. Dorsal aspect of left side of genitalia. x20.

" 86.—*Bombus* (*Bombias*) *morrisoni*, dorsal aspect of left side of genitalia. x20.

" 87.—*Bombus* (*Bombias*) *fraternus*, dorsal aspect of left clasper. x17.

" 88.—*Bombus* (*Bombias*) *crotchii*, dorsal aspect of end of left clasper and sagitta. x20.

" 89.—*Bombus* (*Bombias*) *morrisoni*, ventral aspect of right side of genitalia. x20.

" 90.—*Bombus* (*Bombias*) *separatus*, ventral aspect of right side of genitalia. x20.

PLATE XII.

FIG. 91.—*Psithyrus suckleyi*, new species. Dorsal aspect of left clasper of genitalia. x20.

" 92.—*Psithyrus ashtoni*, dorsal aspect of left side of genitalia. x20.

" 93.—*Psithyrus variabilis*, dorsal aspect of left clasper of genitalia. x20.

FIG. 94.—*Psithyrus laboriosus*, outline of dorsal aspect of left clasper of genitalia. x20.
" 95.—*Psithyrus tricolor*, dorsal aspect of left side of genitalia. x20.
" 96.—*Psithyrus suckleyi*, ventral aspect of right side of genitalia. x20.
" 97.—*Psithyrus variabilis*, ventral aspect of right side of genitalia. x20.
" 98.—*Psithyrus tricolor*, ventral aspect of right side of genitalia. x20.
" 99.—*Psithyrus ashtoni*, ventral aspect of right side of genitalia. x20.

PLATE XIII.

FIG. 100.—*Bombus* (*Bombias*) *nevadensis*, ventral aspect of outer spatha of male. x17.
" 101.—*Bombus fervidus* (Fabricius). Inner spatha of male. x17.
" 102.—*Bombus californicus*, end of sagitta and uncus of male. x40.
" 103.—*Psithyrus interruptus*, outline of labrum of queen. x17.
" 104.—*Bombus ternarius*, spiracle bearing plate of abdomen of queen. x17.
" 105.—*Bombus vagans*, inner spatha. x17.
" 106.—*Bombus* (*Bombias*) *morrisoni*, spiracle bearing plate of abdomen of worker. x17.
" 107.—*Bombus vagans*, outline of labrum of queen. x17.
" 108.—*Bombus mixtus*, dorsal aspect of end of left clasper. x40.
" 109.—*Bombus mixtus*, ventral aspect of end of right clasper. x40.
" 110.—*Bombus fernaldi*, ventral aspect of end of right clasper. x40.
" 111.—*Bombus affinis*, ventral aspect of outer spatha. x17.

PLATE XIV.

FIG. 112.—*Psithyrus variabilis*, ventral aspect of outer spatha. x17.
" 113.—*Bombus affinis*, inner spatha. x17.
" 114.—*Bombus bimaculatus*, outline of labrum of queen. x17.
" 115.—*Bombus kirbyellus*, apex of inner spatha. x17.
" 116.—*Bombus* (*Bombias*) *nevadensis*, spiracle bearing plate of abdomen of queen. x17.
" 117.—*Bombus* (*Bombias*) *crotchii*, ventral aspect of outer spatha. x17.
" 118.—*Bombus californicus*, spiracle bearing plate of abdomen of queen. x17.
" 119.—*Bombus occidentalis* Greene. Ventral aspect of left side of genitalia. x17.
" 120.—*Bombus occidentalis*, dorsal aspect of left side of genitalia. x17.
" 121.—*Bombus affinis*, end of sagitta of male. x40.

PLATE XV.

FIG. 122.—*Bombus* (*Bombias*) *rufocinctus*, ventral aspect of outer spatha. x17.

" 123 —*Bombus kirbyellus*, ventral aspect of outer spatha. x17.

" 124.—*Bombus* (*Bombias*) *auricomus*, ventral aspect of outer spatha. x17.

" 125.—*Bombus sitkensis* Nylander. Ventral aspect of outer spatha. x17.

" 126.—*Bombus pennsylvanicus*, ventral aspect of outer spatha. x17.

" 127.—*Bombus separatus*, inner spatha. x17.

" 128.—*Bombus terricola* Kirby. Inner spatha. x17.

" 129.—*Bombus separatus*, ventral aspect of outer spatha. x17.

" 130.—*Bombus* (*Bombias*) *crotchii*, inner spatha. x17.

PLATE XVI.

FIG. 131.—*Bombus vagans*, ventral aspect of outer spatha. x17.

" 132.—*Bombus pennsylvanicus*, inner spatha. x17.

" 133.—*Bombus impatiens*, inner spatha. x17.

" 134.—*Bombus* (*Bombias*) *morrisoni*, inner spatha. x17.

" 135.—*Bombus affinis*, inner spatha. x17.

" 136.—*Bombus* (*Bombias*) *auricomus*, apex of inner spatha. x17.

" 137.—*Bombus ternarius*, ventral aspect of outer spatha. x17.

" 138.—*Bombus appositus*, inner and outer spathas together. x17.

" 139.—*Bombus* (*Bombias*) *nevadensis*, inner spatha. x17.

" 140.—*Bombus perplexus*, ventral aspect of outer spatha. x17.

PLATE XVII.

FIG. 141.—*Psithyrus ashtoni*, inner spatha. x26.

" 142.—*Bombus ternarius*, inner spatha. x26.

" 143.—*Bombus separatus*, inner spatha. x26.

" 144.—*Bombus sitkensis*, inner spatha. x26.

" 145.—*Bombus perplexus*, inner spatha. x26.

" 146.—*Psithyrus tricolor*, inner spatha. x26.

PLATE XVIII.

FIG. 147.—*Bombus dahlbomii* Guérin. Genital guide of queen. x68.

" 148.—*Bombus dolichocephalus* Handlirsch. Outer spatha of male. x25.

" 149.—*Bombus affinis*, genital guide of worker. x68.

" 150.—*Bombus polaris* Curtis. Ventral aspect of right side of genitalia of male. x80.

" 151.—*Bombus auricomus*, genital guide of queen. x68.

" 152.—*Bombus rubicundus* Smith. Outer spatha of male. x25.

" 153.—*Bombus funebris* Smith. Outer spatha of male. x25.

FIG. 154.—*Bombus pulcher* Cresson. Ventral aspect of right clasper of male. x80.
" 155.—*Bombus coccineus* Friese. Outer spatha of male. x25.
" 156.—*Bombus sonomæ* Howard. Dorsal aspect of right clasper of male. x80.
" 157.—*Bombus borealis*, genital guide of queen. x68.
" 158.—*Bombus polaris*, dorsal aspect of left side of genitalia. x80.

PLATE XIX.

FIG. 159.—*Bombus pullatus* new species. Dorsal aspect of right clasper of male. x80.
" 160.—*Bombus mexicanus* Cresson. Ventral aspect of left side of genitalia of male. x80.
" 161.—*Bombus atratus* new species. Dorsal aspect of left clasper of male. x80.
" 162.—*Bombus medius* Cresson. Dorsal aspect of right clasper of male. x80.
" 163.—*Bombus medius*, ventral aspect of left side of genitalia. x80.
" 164.—*Bombus mexicanus*, dorsal aspect of left clasper of male. x80.
" 165.—*Bombus polaris*, inner spatha of male. x48.
" 166.—*Bombus pullatus*, ventral aspect of left side of genitalia of male. x80.
" 167.—*Bombus atratus*, ventral aspect of left side of genitalia of male. x80.

PLATE XX.

FIG. 168.—*Bombus carolinus* Linnaeus. Outline (not showing the genital hairs) of dorsal aspect of right side of genitalia of male. x80.
" 169.—*Bombus affinis*, genital guide of worker. x68.
" 170.—*Bombus dahlbomii*, outline (not showing the genital hairs) of dorsal aspect of left side of genitalia of male. x80.
" 171.—*Bombus dolichocephalus*, outline (not showing the genital hairs) of dorsal aspect of right clasper of male genitalia. x80.
" 172.—*Bombus impatiens*, genital guide of queen. x68.
" 173.—*Bombus kirbyellus*, genital guide of queen. x68.
" 174.—*Bombus dahlbomii*, outer spatha of male. x25.
" 175.—*Bombus brachycephalus* Handlirsch. Outline (not showing the genital hairs) of dorsal aspect of right side of genitalia of male. x80.
" 176.—*Bombus affinis*, genital guide of queen. x68.
" 177.—*Bombus ephippiatus* Say. Outline (not showing the genital hairs) of dorsal aspect of left clasper of male genitalia. x80.
" 178.—*Bombus funebris*, outline (not showing the genital hairs) of dorsal aspect of left side of male genitalia. x80.

PLATE XXI.

FIG. 179.—*Bombus dahlbomii* Guérin, male. Ventral aspect of left side of genitalia. x80.

" 180.—*Bombus funebris* Smith, male. Ventral aspect of left side of genitalia. x80.

" 181.—*Bombus robustus* Smith, male. Ventral aspect of right side of genitalia. x80.

" 182.—*Bombus brasiliensis* Lepeletier, male. Ventral aspect of left side of genitalia. x80.

" 183.—*Bombus montezumae* Cockerell, male. Ventral aspect of left side of genitalia. x80.

" 184.—*Bombus incarum* n. sp., male. Dorsal aspect of right side of genitalia. x80.

" 185.—*Bombus coccineus* Friese, male. Ventral aspect of left clasper. x80.

" 186.—*Bombus rubicundus* Smith, male. Ventral aspect of right side of genitalia. x80.

" 187.—*Bombus incarum*, male. Ventral aspect of left side of male genitalia. x80.

" 188.—*Bombus brachycephalus* Handlirsch, male. Ventral aspect of left side of genitalia. x80.

" 189.—*Bombus carolinus* (Linnaeus), male. Ventral aspect of left side of genitalia. x80.

PLATE XXII.

FIG. 190.—*Bombus ephippiatus* Say, male. Ventral aspect of left side of genitalia. x80.

" 191.—*Bombus coccineus* Friese, male. Outline drawing of dorsal aspect of left clasper. x80.

" 192.—*Bombus coccineus*, male. Outline drawing of dorsal aspect of right sagitta and uncus. x80.

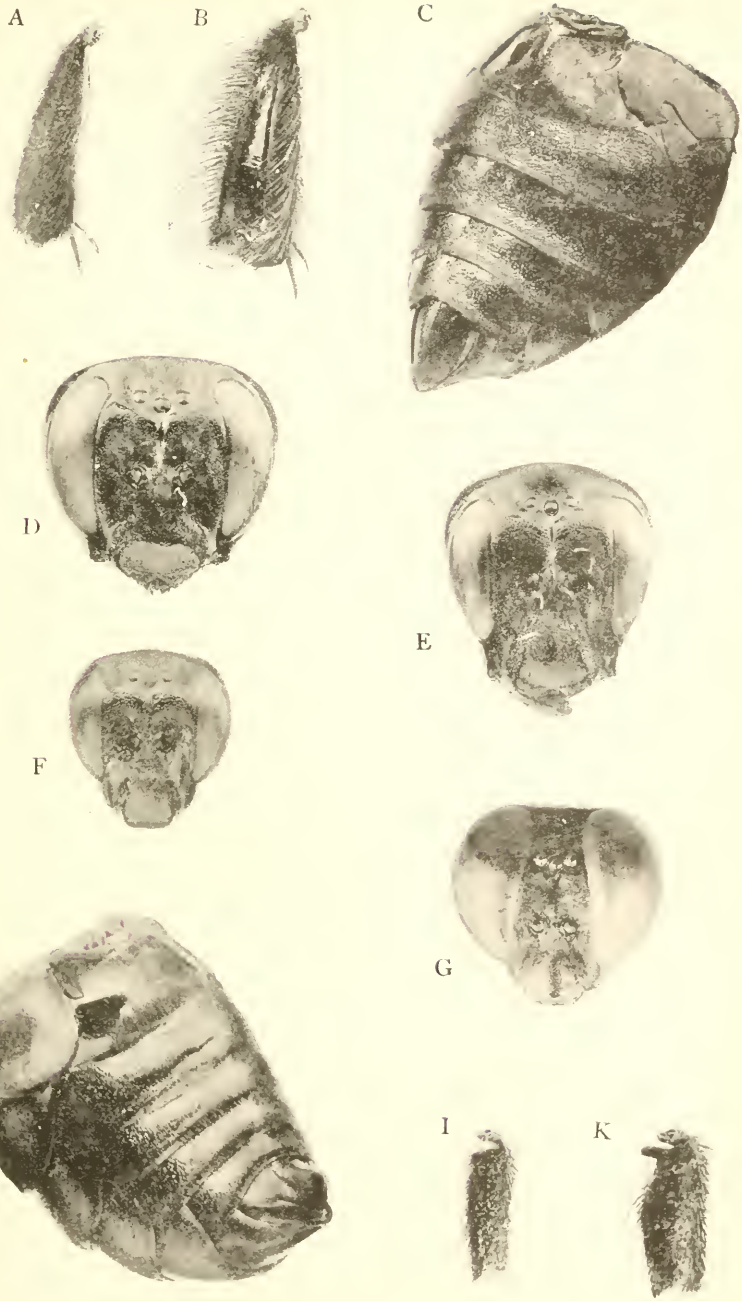
" 193.—*Bombus montezumae* Cockerell, male. Outline drawing of dorsal aspect of right clasper. x80.

" 194.—*Bombus pulcher* Cresson, male. Outline drawing of dorsal aspect of left clasper. x80.

" 195.—*Bombus rubicundus* Smith, male. Outline of dorsal aspect of left side of genitalia.

" 196.—*Bombus dolichocephalus* Handlirsch, male. Ventral aspect of left side of genitalia. x80.

" 197.—*Bombus robustus* Smith, male. Outline of dorsal aspect of left side of genitalia. x80.



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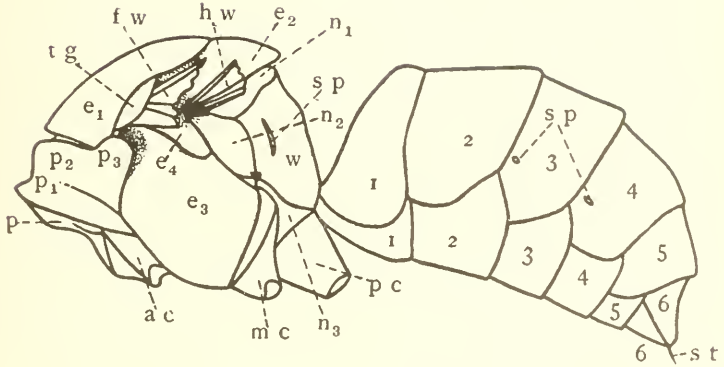

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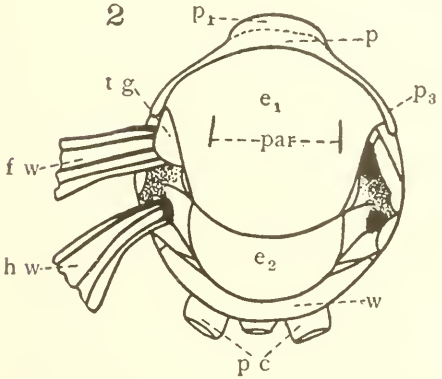

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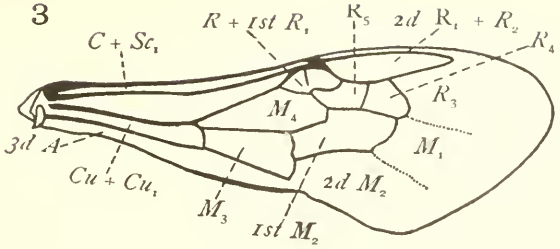

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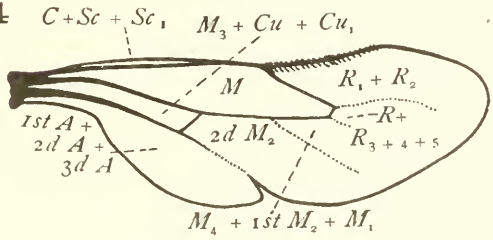

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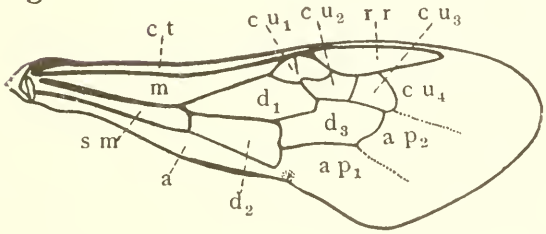

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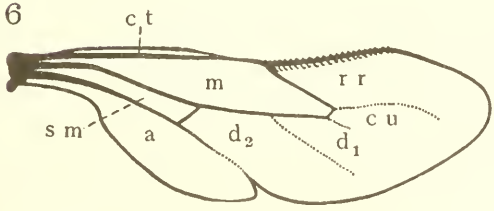

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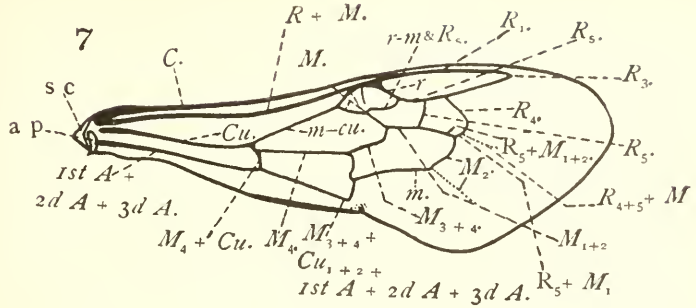
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R₅ + M₁₊₂.
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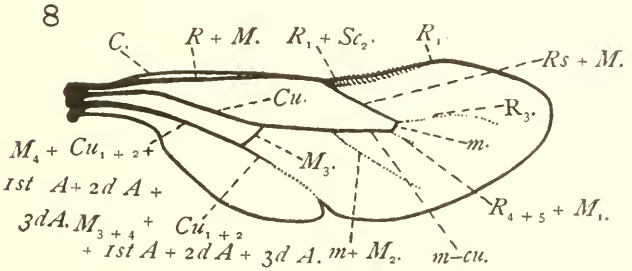
8
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3d A. M₃₊₄ +
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+ 1st A + 2d A + 3d A.
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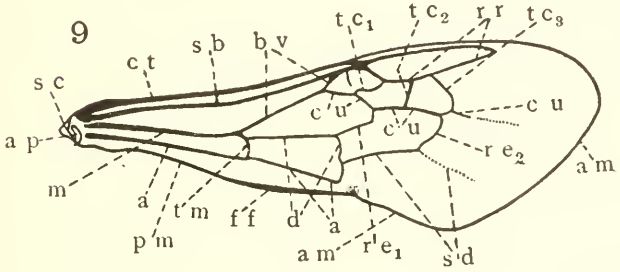
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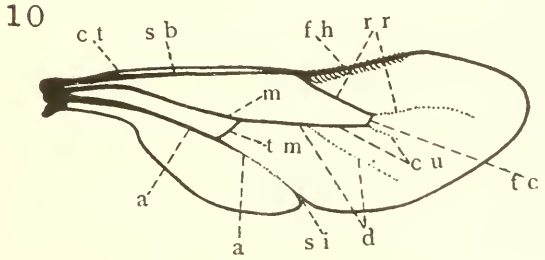
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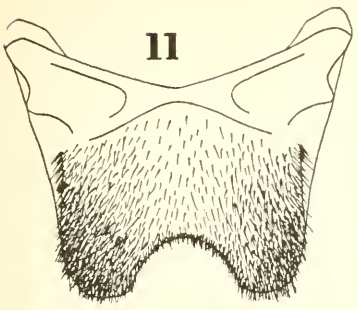

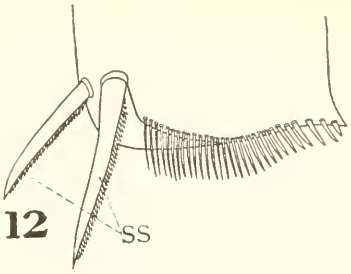

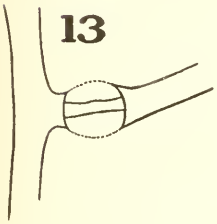

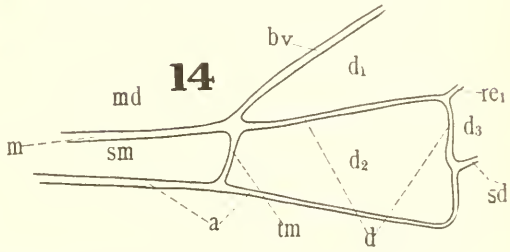

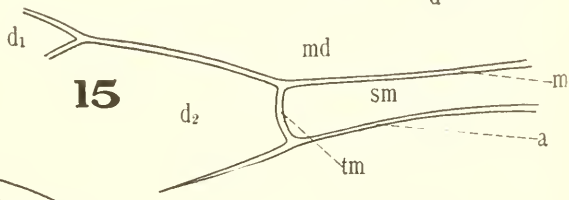

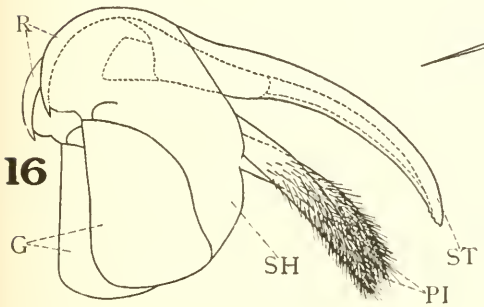

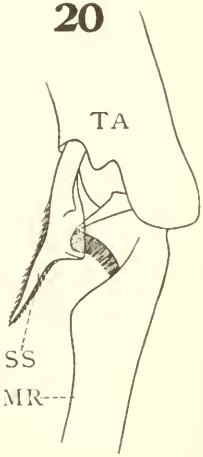

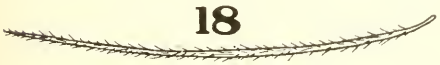

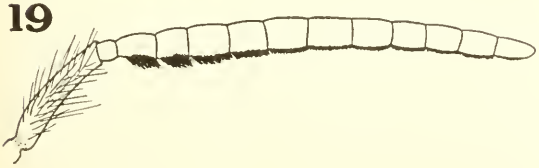

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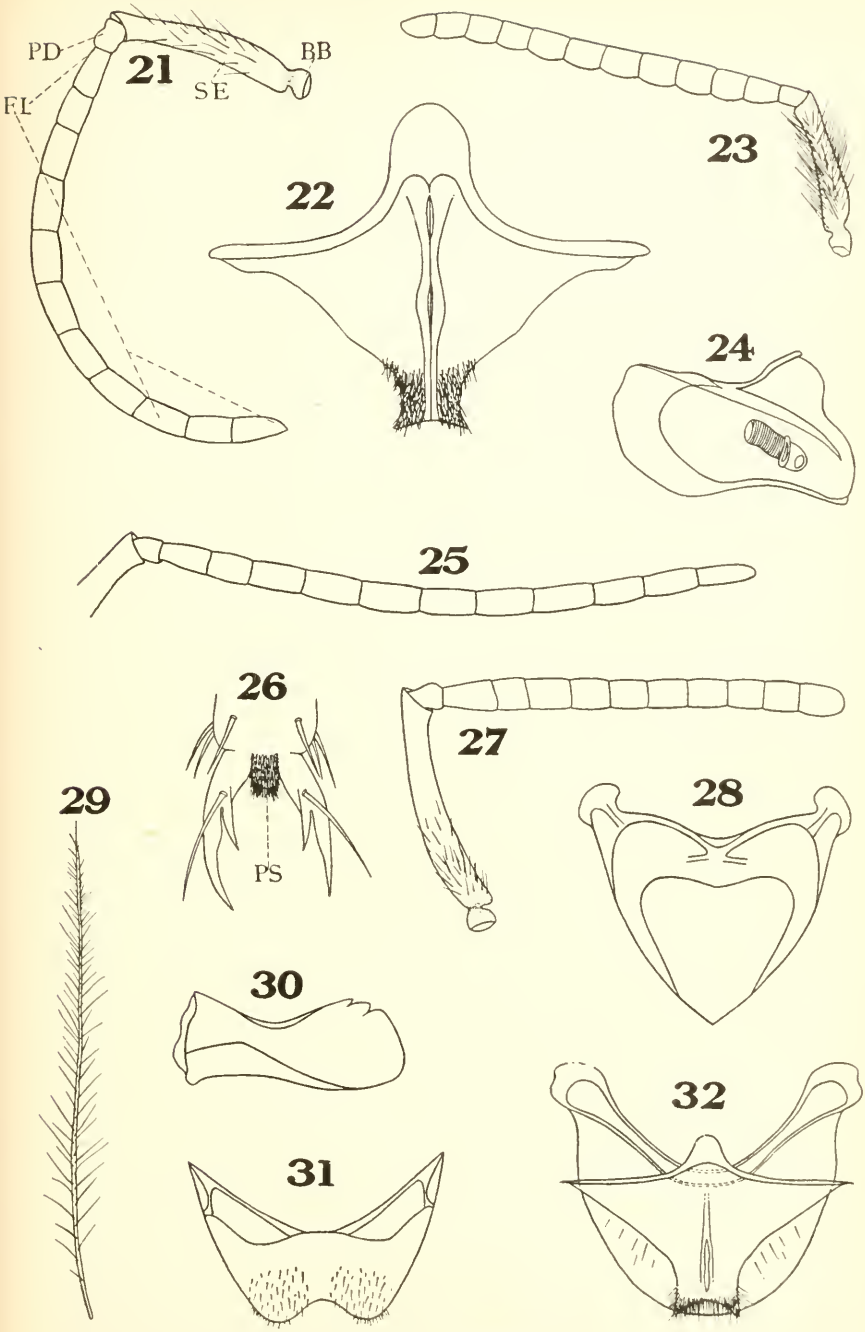

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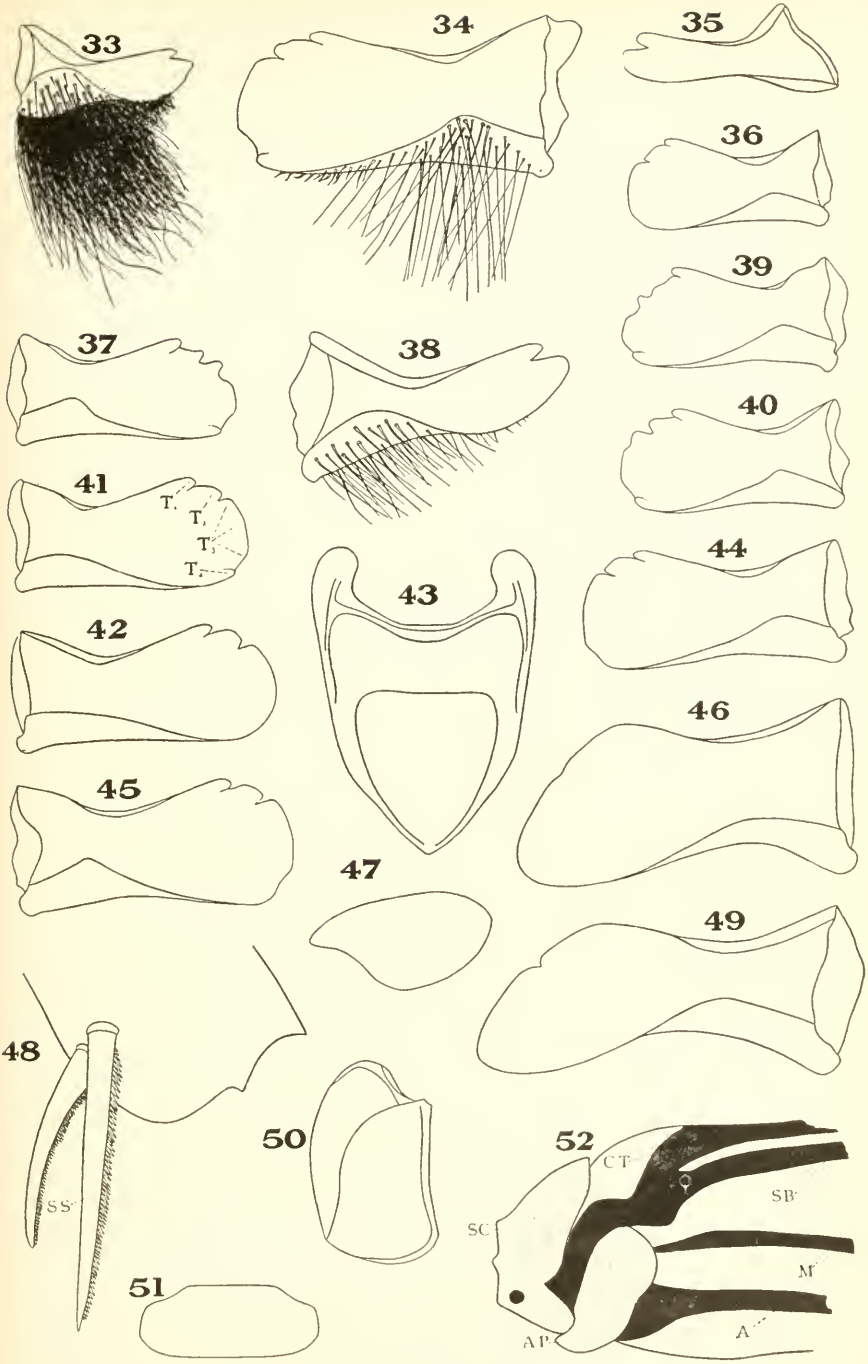

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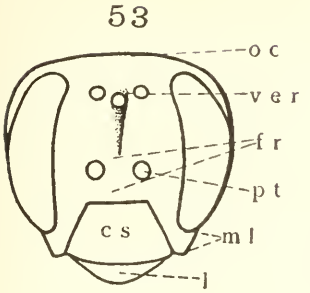

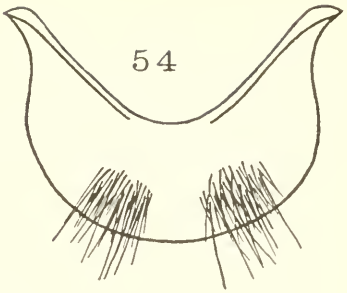

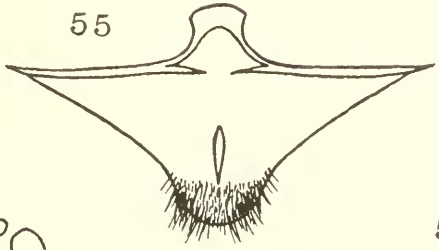

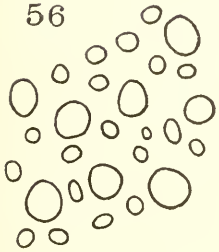

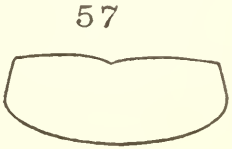

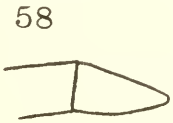

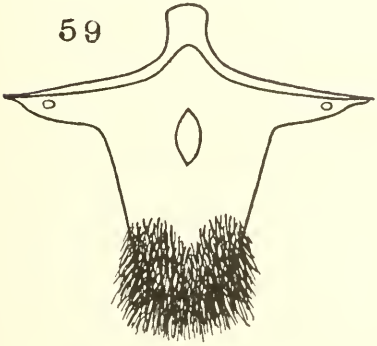

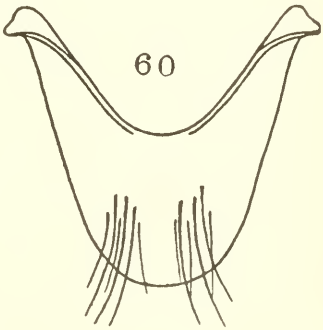

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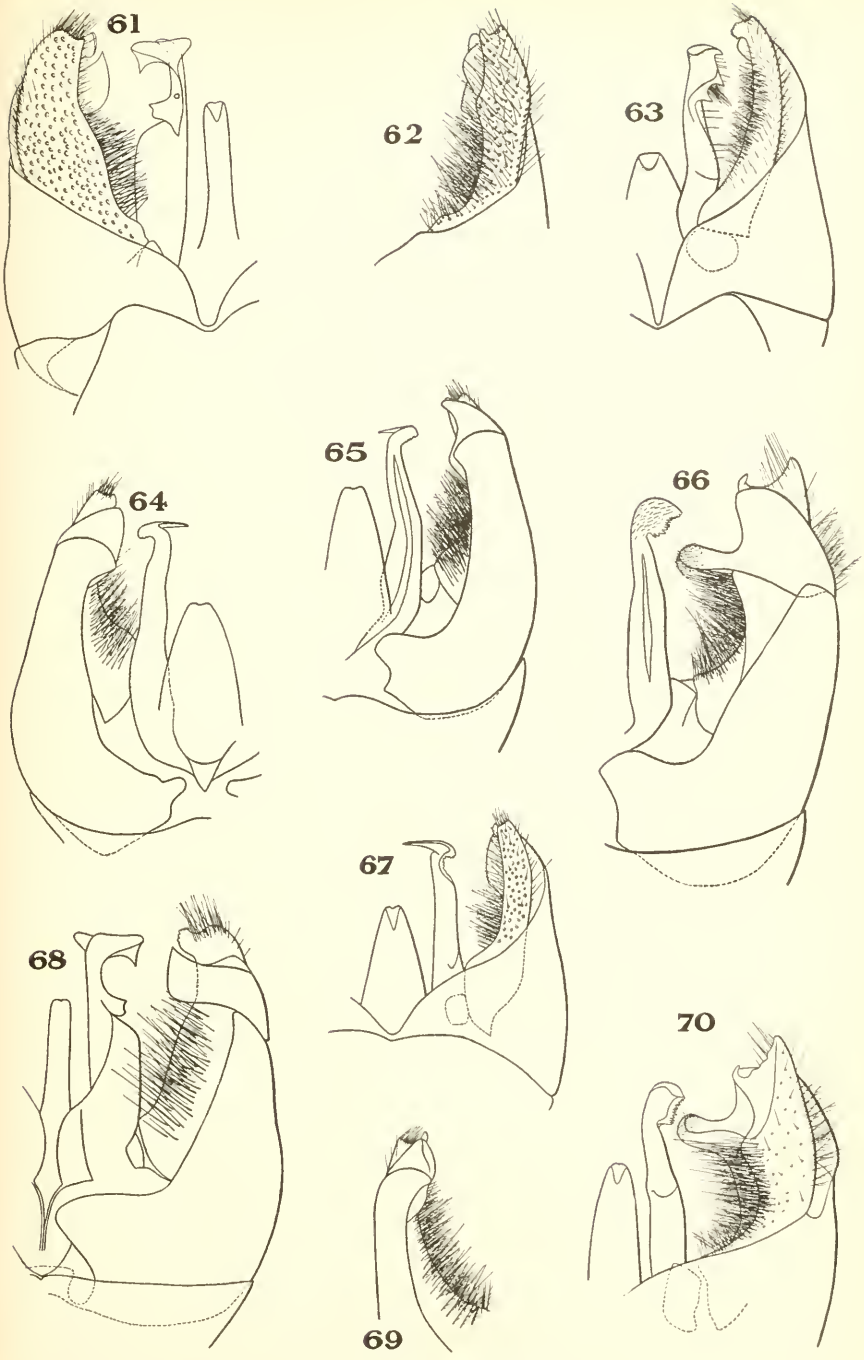

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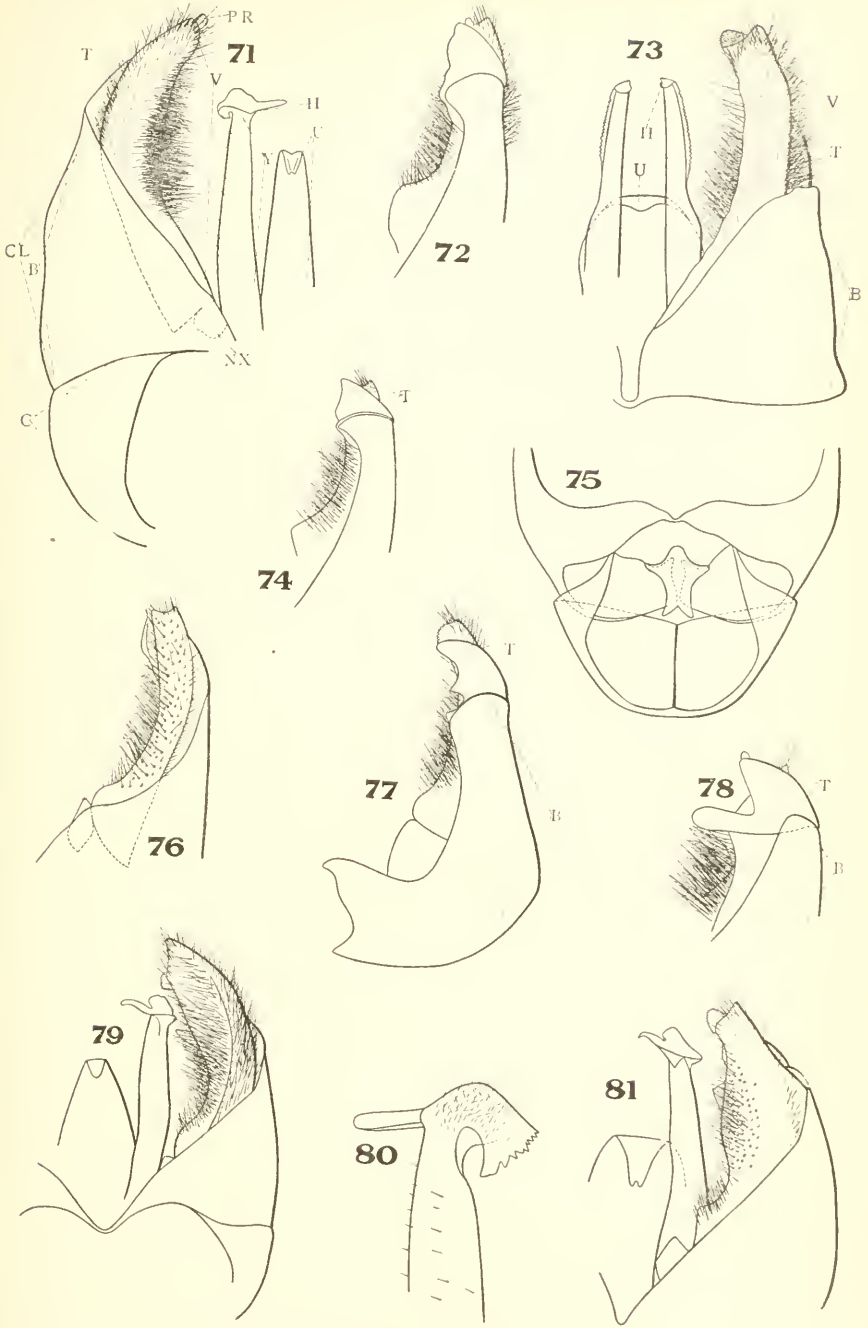

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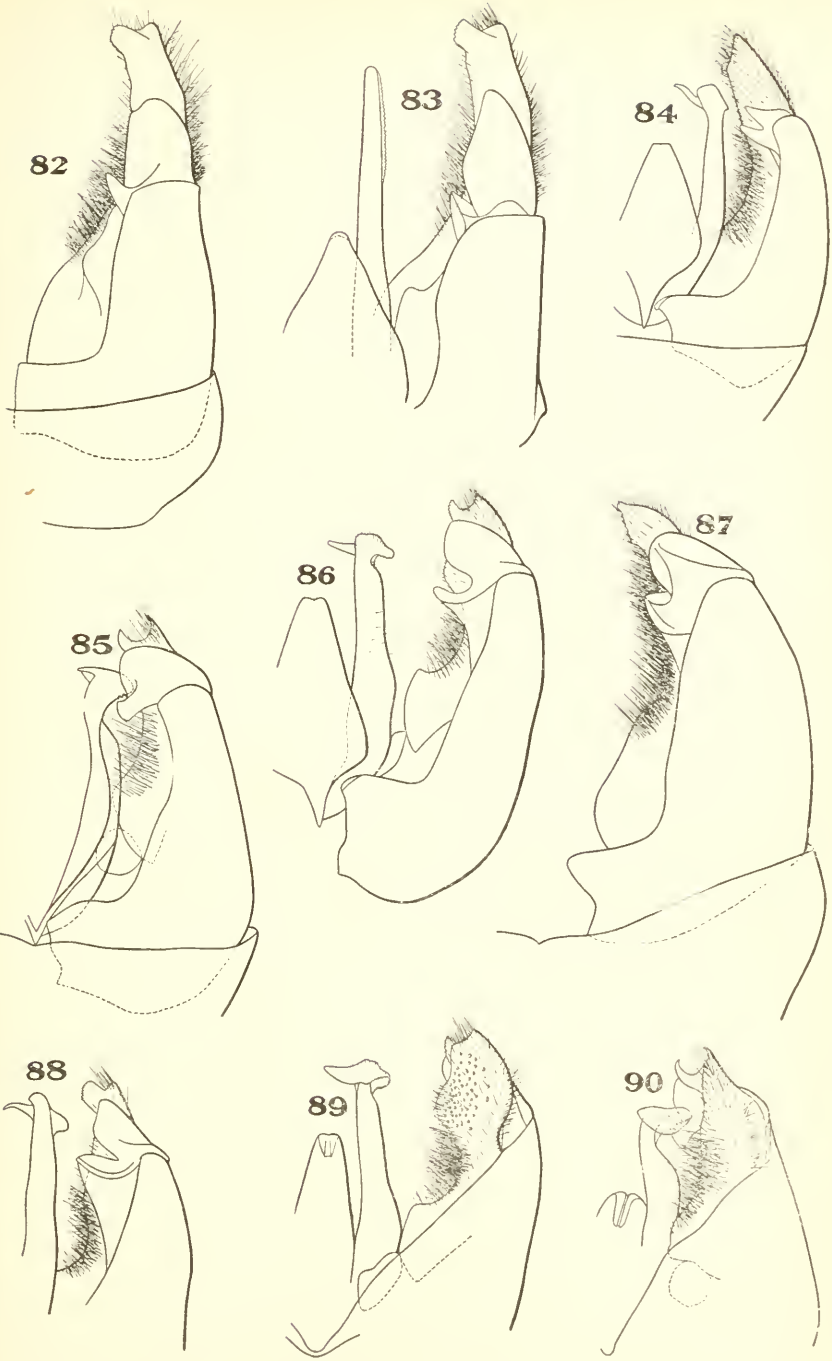

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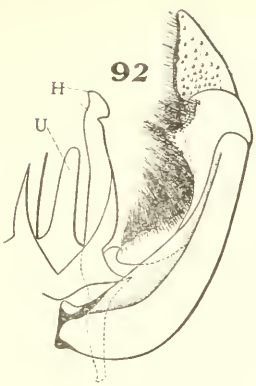
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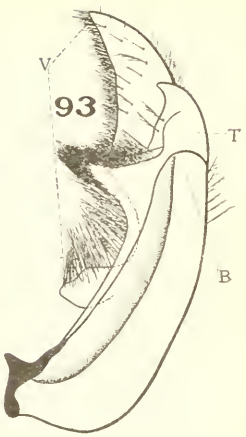
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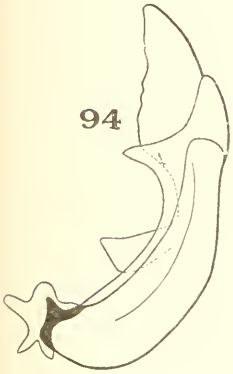
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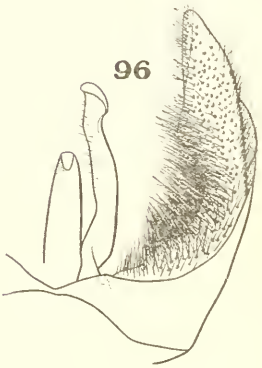
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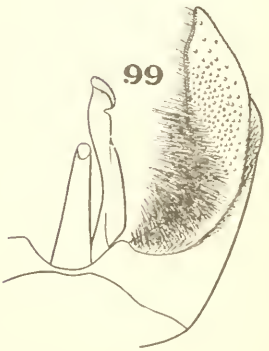
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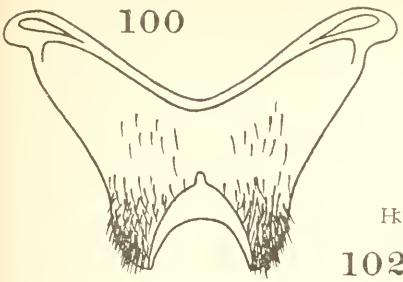
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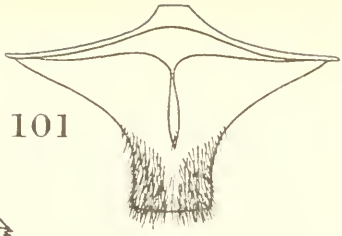
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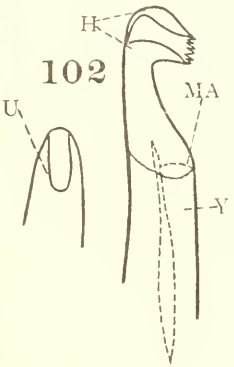
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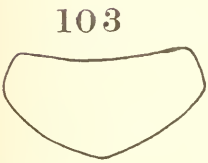
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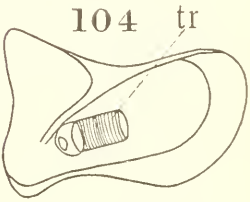
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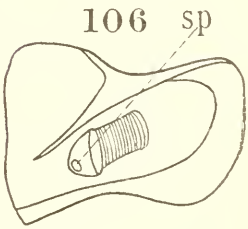
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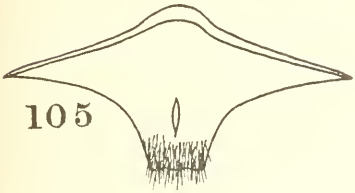
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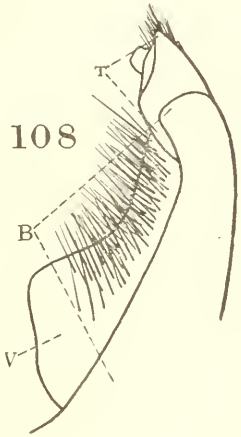
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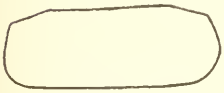
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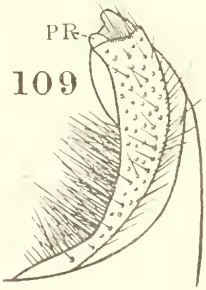
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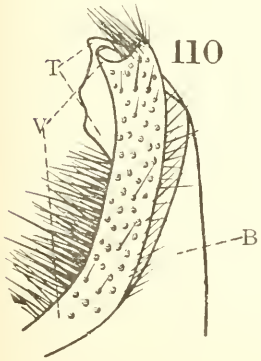
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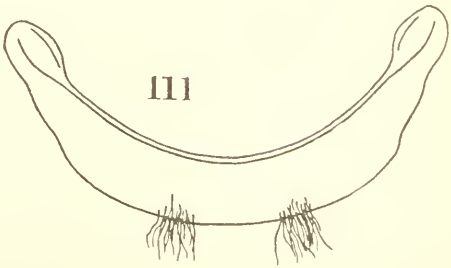
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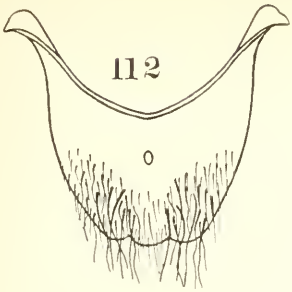

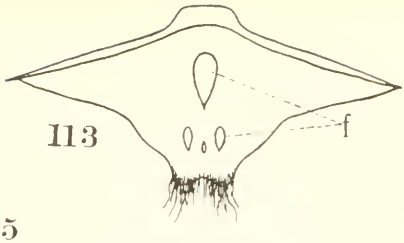

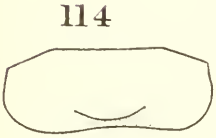

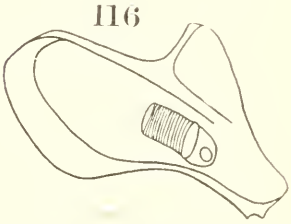

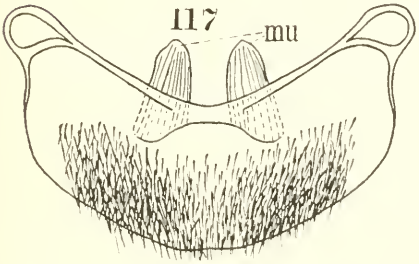

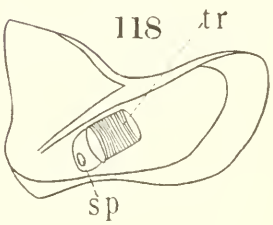

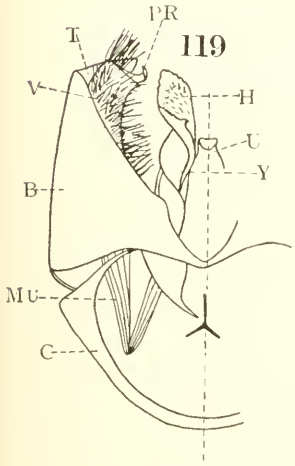

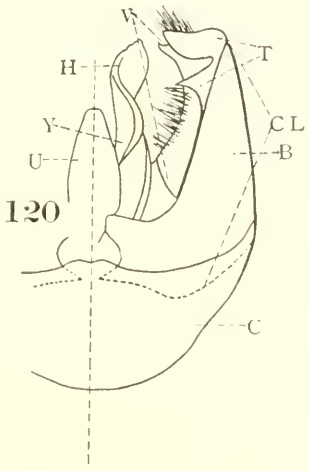

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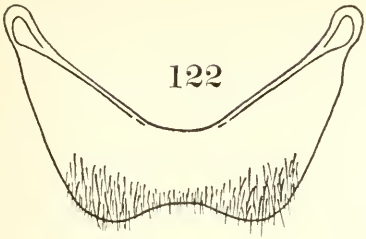

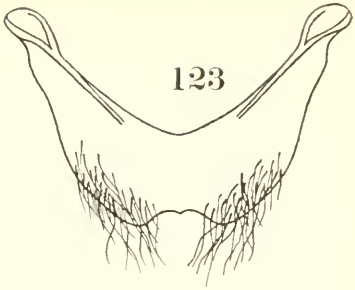

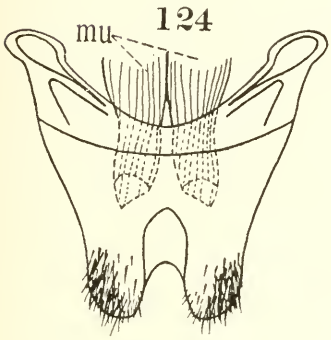

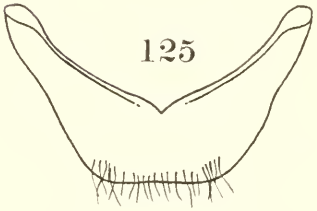

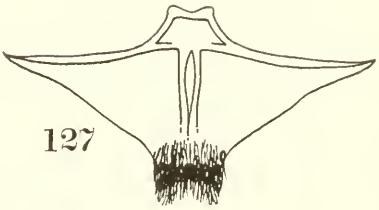

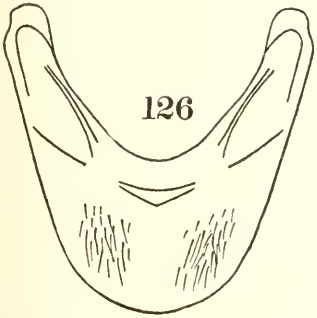

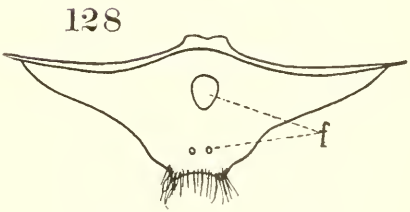

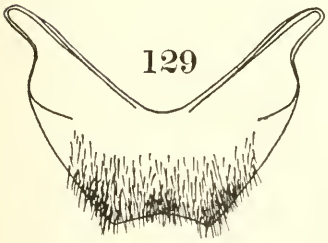

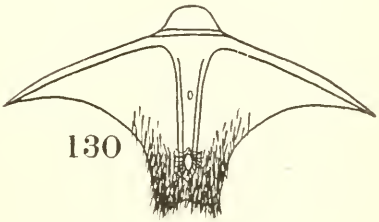

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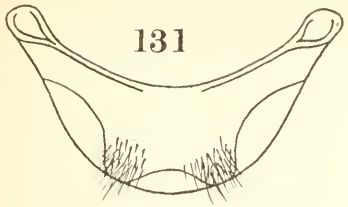
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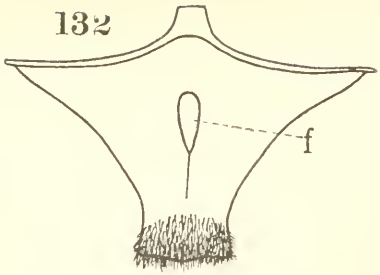
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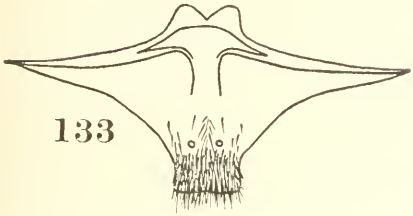
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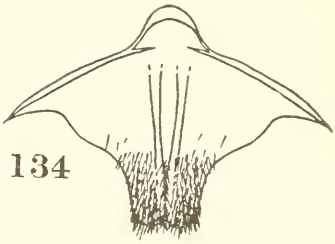
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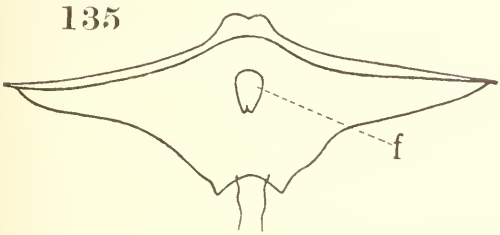
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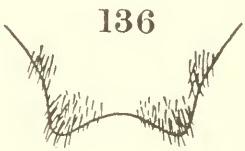
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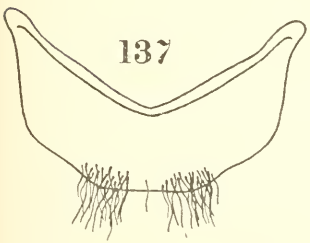
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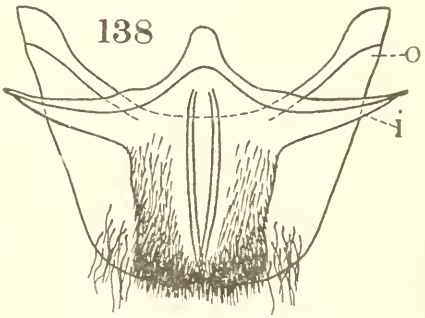
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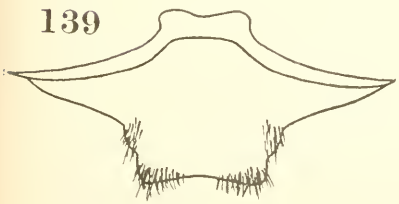
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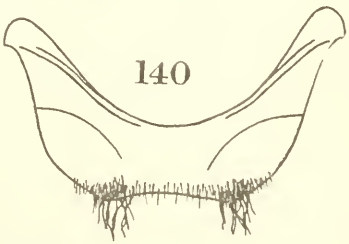
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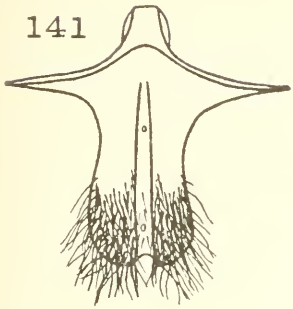

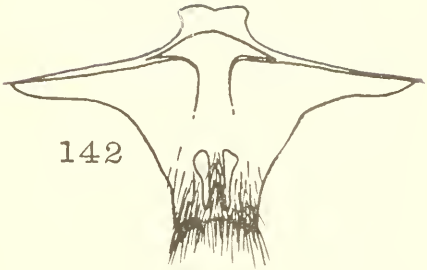

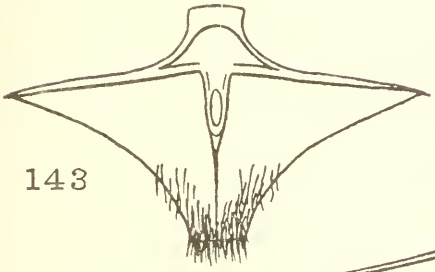

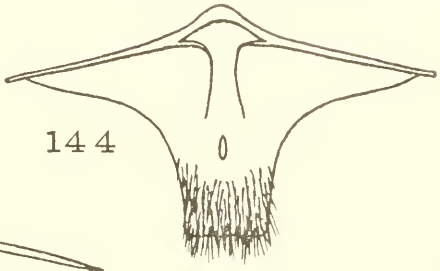

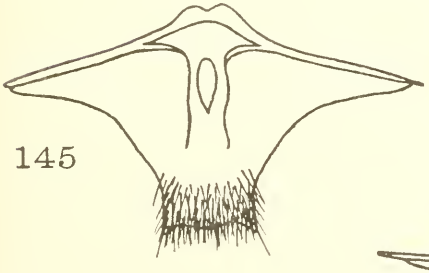

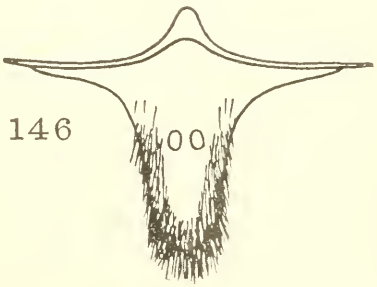

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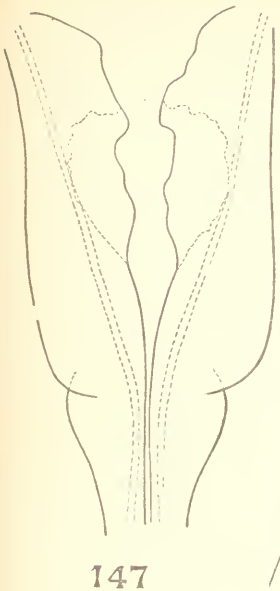

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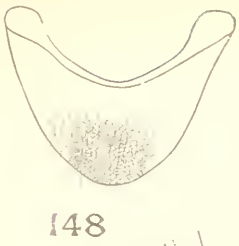

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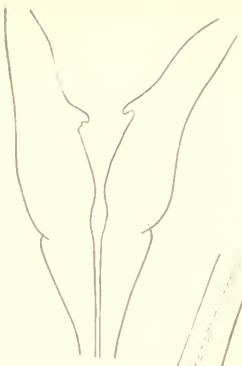

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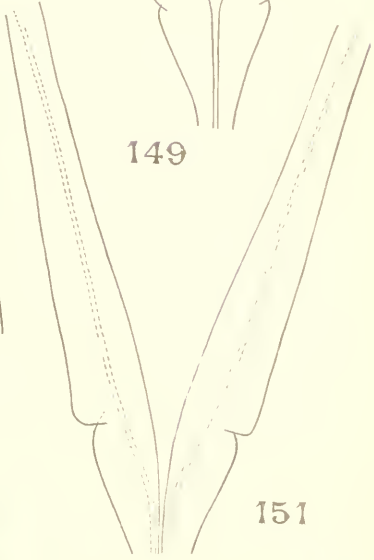

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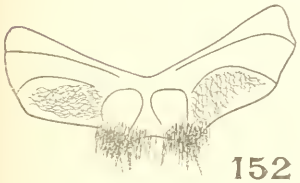

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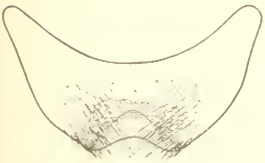

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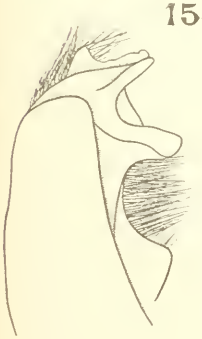

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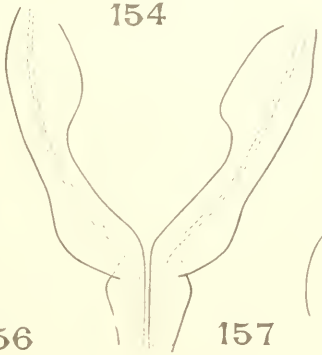

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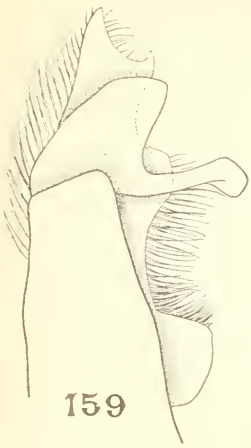

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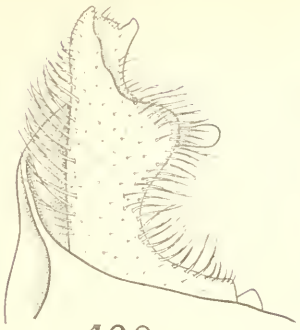

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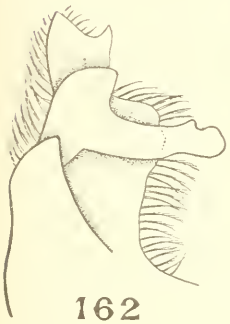

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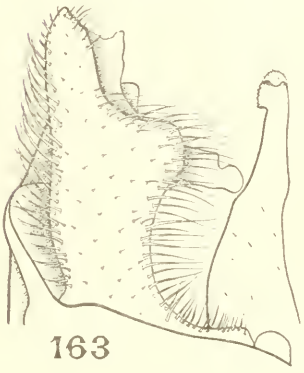

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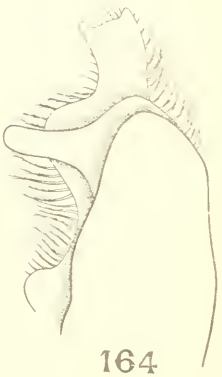

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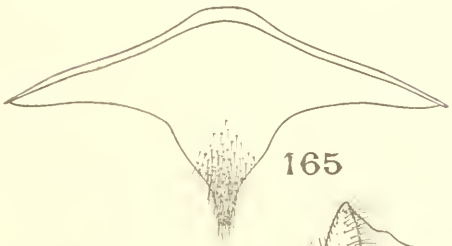

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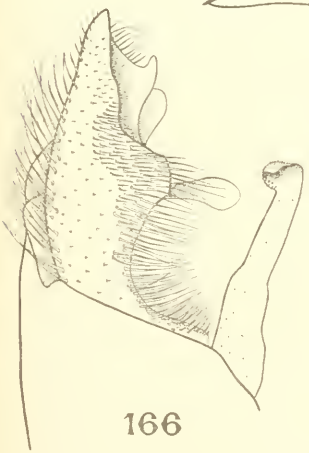

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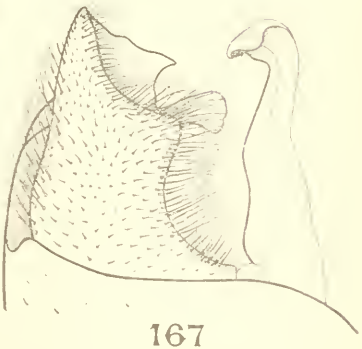

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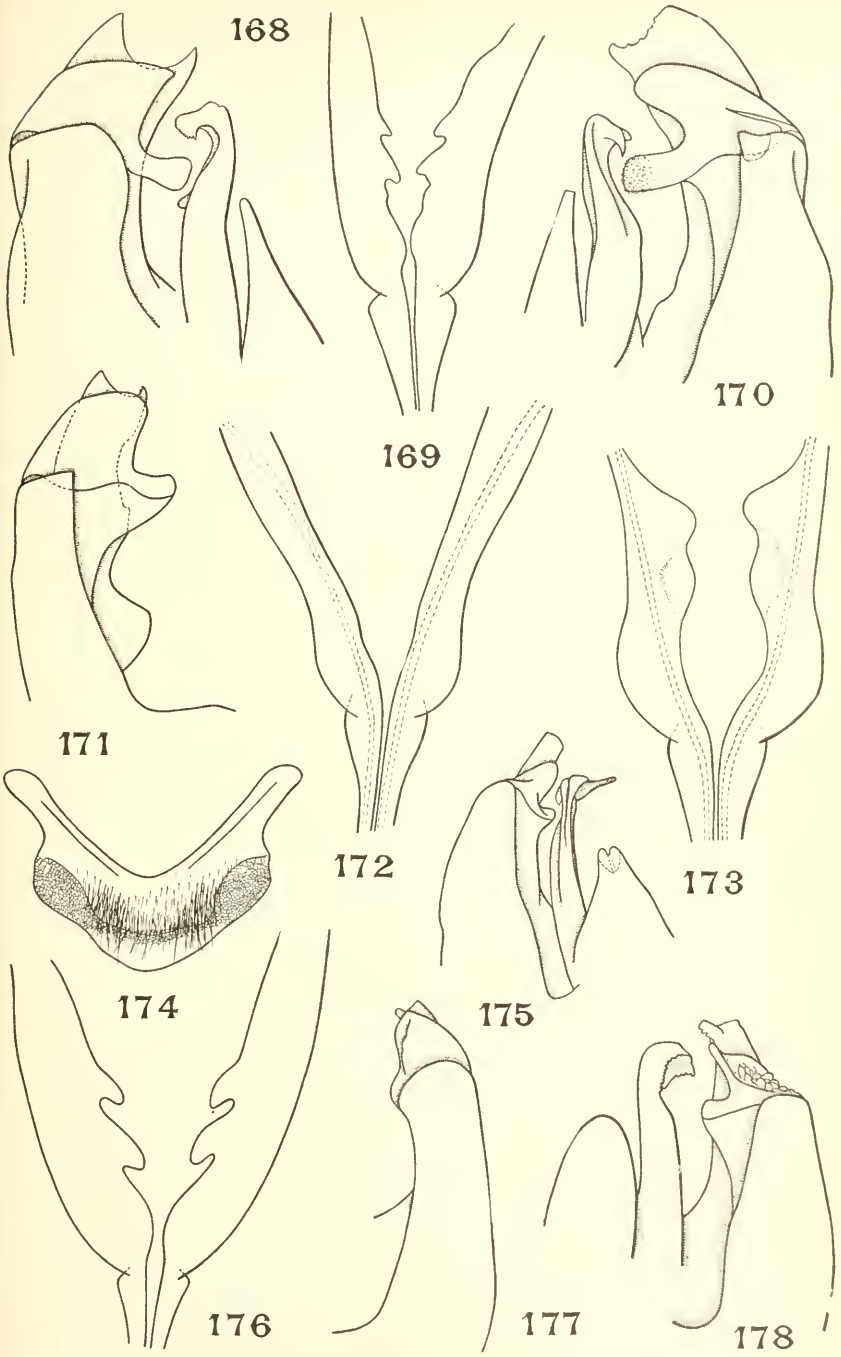

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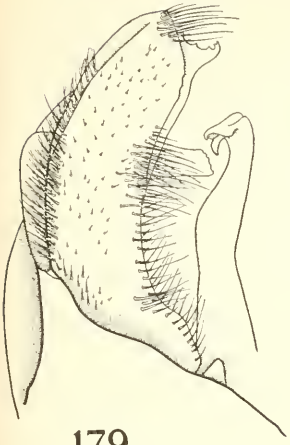

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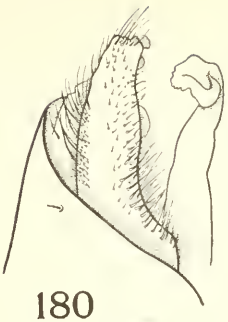

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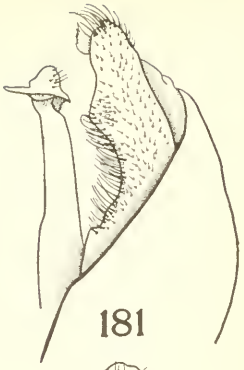

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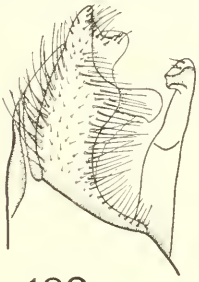

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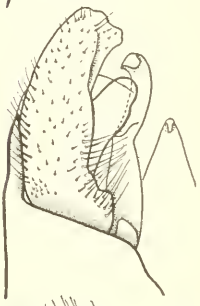

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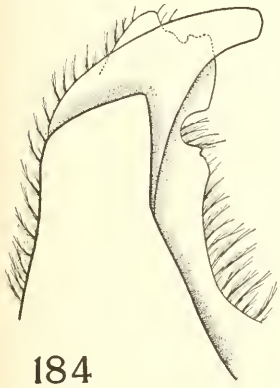

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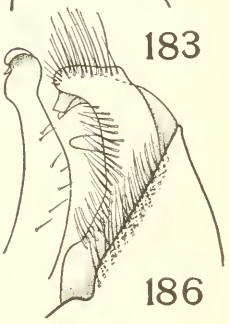

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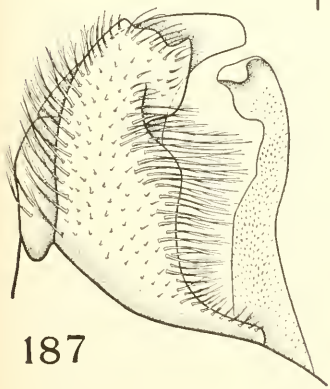

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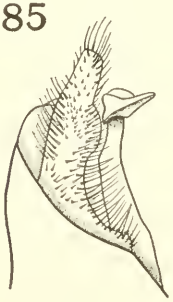

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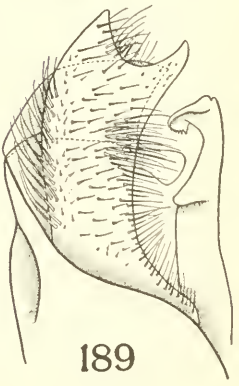

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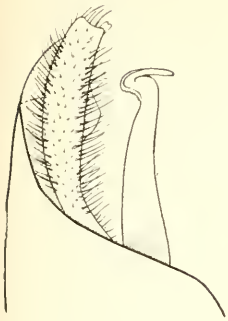

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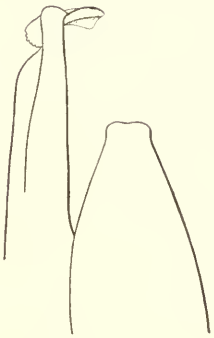

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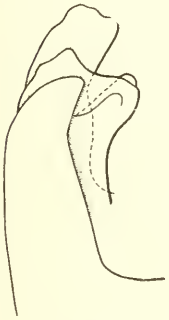

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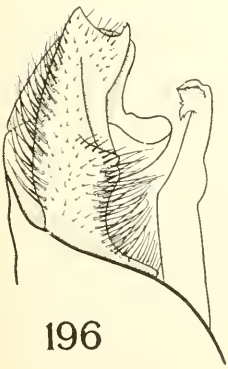

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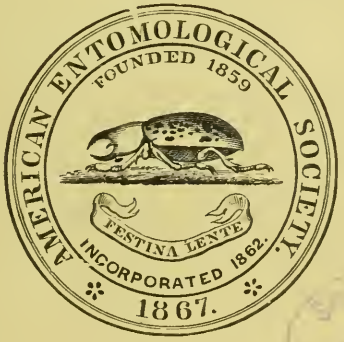


PUBLISHED BY THE AMERICAN ENTOMOLOGICAL SOCIETY AT THE
ACADEMY OF NATURAL SCIENCES,
PHILADELPHIA.

SUBSCRIPTION PRICE FOUR DOLLARS PER VOLUME.

SYNOPSES AND DESCRIPTIONS OF EXOTIC NEUROPTERA.

By Nathan Banks.

Included below, with the descriptions of various new genera and species, are synopses of the genera of Panospidae, Osmylinae, Hemerobiinae, Mantispidae, South American Myrmeleonidae and a new classification of the Perlidae; most of the synoptic work is a result of a study of several European collections.

The types of all the new species described in this paper are in the author's collection.

PERLIDAE.

Twice I have published classifications of the American Perlidae. After seeing several genera (hitherto unknown to me) in European museums I have prepared a new arrangement, which, however, differs little from the others as far as American species are concerned, but places in the same scheme the various exotic genera.

For the principal character I would use the shape of the anterior part of the head.

1. Clypeus practically invisible, or only projecting from beneath the raised margin of the front of the head; tarsi with the last joint very much longer than the first and second together, the first joint barely, if any longer, than the width of the tibia at tip; coxae I widely separate; setae present; no series of cross-veins in the cubito-anal space.....PERLINAE.

   Clypeus visible in continuation of the general surface of the head, and separated by a suture from the head; tarsi with the last joint but little or not longer than the first and second together, the first joint longer than the width of the tibiae at tip, last joint of palpi as large as others.....2.

2. Many cross-veins in the apical part of fore wings; median vein not united to the radius near base; setae well developed; second tarsal joint much shorter than others...PTERONARCINAE.

   Few cross-veins in the apical part of the fore-wings; median vein united to the radius toward base; first and second tarsal joints together longer than the third .....NEMOURINAE.

Subfamily Perlinae may be divided into two tribes as follows:

Median vein united to radius near base; anal cell with one branched vein..... .....CHLOROPERLINI.

Median vein not united to radius near base, but running closely parallel thereto; anal cell with two veins.....PERLINI.

The Chloroperlini include three genera, *Chloroperla* and *Alloperla* in which the last joint of the maxillary palpus is very minute, and *Paraperla* in which this joint is well developed. *Paraperla* also has a series of cubital cross-veins in the hind wings. In venation this tribe is remarkably similar to the Nemourini, but differ by well developed setae and the retracted clypeus.

The Perlini includes many genera, most of which I have tabulated in my tables of American Perlidae or are given by Enderlein (Zool. Anzeiger, xxxiv, p. 388, 1909). I cannot consider the number of ocelli as of importance in grouping genera, since one of the two ocelli genera—*Hemacroneuria*, is evidently more related to *Acroneuria* than to *Neoperla*. The genus *Ochthopetina* made for Old World Neoperlas is very doubtfully distinct from *Neoperla*. *Macrogynoplax* differs from *Neoperla* only in the female genitalia. *Cryptoperla* differs from *Neoperla* in the hairy eyes and frontal ridge of head. *Niponiella* I would consider as *Acroneuria*, *Dictyogenus* as *Isogenus*, and *Dictyopterygella* as a *Perlodes*. The several divisions of *Perlodes* and *Isogenus* made by Klapalek are hardly more than subgenera, and mostly based on genital characters. *Tropidogonoplax* is about the same as *Ochthopetina* and *Tavanita* a synonym of *Ochthopetina*.

Subfamily Pteronarcinae may be divided into three tribes as follows:

Anterior coxae more approximate than the others; many costal cross-veins; no cross-veins in the cubito-anal space of the fore-wings.....PTERONARCINI.

Anterior coxae widely separated; no series of cross-veins in cubito-anal space; few costal cross-veins.....LEPTOPERLINI.

Anterior coxae widely separated; a series of cross-veins in the cubito-anal space of fore-wings.....EUSTHENINI.

The Eusthenini includes three genera; *Stenoperla*, green

in color, and with very few costal cross-veins, *Diamphipnoa*, which has many costal cross-veins, and *Eusthenia* with partly red or violaceous wings, *Diamphipnoa* has lichen-green wings, and the median series of cross-veins in fore wings is crossed.

Diamphipnoa lichenalis Gerst. has the anterior coxae widely separated; last joint of tarsi longer than the two others together; ocellar triangle longer than broad behind; the subcosta runs into the radius at tip; many of the median cross-veins crossed; a series of cross-veins in the cubito-anal region (not in *Pteronarcys*).

Eusthenia thalia and *E. diversipes* belong to *Austroperla*. There are no series of cross-veins in the cubito-anal space, and the costal area has cross-veins all along; the anal cell has two branches, setae very short. The two species are very similar. The genus *Heteroperla* Hare is a synonym of *Austroperla*.

The Leptoperlini is the group of *Antarctoperla* of Enderlein; small, slender, dark species, looking much like Nemourini but with many cross-veins, sometimes only indicated, in the apical part of wing. The type of *Leptoperla*, *L. beroe* Newm. has slender legs, long antennae, and long setae, the last joint of tarsus not equal to the basal two; the radial sector soon forks as seen in figure 29. In *L. opposita* the setae are shorter, the tarsi have last joint longer, and radial sector is simple, while the cubitus is forked as in figure 30. The genus *Parantoperla* is very close to *L. opposita*. *Aucklandobius* is hardly distinct from *Notoperla*.

The genera of this section may be tabulated as follows:

1. Many costal cross-veins; setae very short.... .....**Austroperla.**
   Only one or two costal cross-veins.....2.
2. Radial sector of fore-wings forked.....3.
   Radial sector of fore-wings not forked.....4.
3. Radial sector forked toward tip; cubitus forked at the basal cross-vein.....**Gripepteryx.**
   Radial sector forked near base; cubitus forked long before the basal cross-vein .....**Leptoperla.**
4. Hind-wings with cubital cross-veins...**Notoperla** (*Aucklandobius*).
   Hind-wings without cubital cross-veins.
   Antarctoperla (*Parantoperla*).

Pictet's type of *Gripopteryx cancellata* has the vein from anal cell forked, two costal cross-veins, one near base, and one at tip; hind wings with three cubital cross-veins near tip; radial sector of fore wings with one branch, the median vein before the large basal cross-vein is rather weak but distinct, in both wings the cubitus forks at this cross-vein; last joint of tarsi plainly longer than basal two together; the setae with many very short joints.

Paragripopteryx differs only in having a cross-vein beyond end of the subcosta.

The Pteronarcini includes only the two northern genera, *Pteronarcys* and *Pteronarcella* occurring in northern North America and Siberia.

The subfamily Nemourinae can be divided into two tribes as follows:

Anal cell with one simple vein; setae usually distinct.....CAPNINI.
Including *Capnia*, *Capnura*, *Capnopsis*, *Arsapnia* and *Capioneura*.

Anal cell with a forked vein; setae rudimentary.....NEMOURINI.
Including *Nemoura*, *Perlomyia*, *Udamoceria*, *Leuctra*, *Taeniopteryx* (with three subgenera) and *Taenionema*.

Ochthopetina clarissa n. sp.—Almost wholly clear pale yellow; tips of palpal joints dark; antennae beyond base brownish; ocelli and eyes black; tarsi rather dark; last five joints of anal setae dark; venation wholly pale yellowish, probably greenish when alive. Ocelli nearly contiguous; lateral bosses smaller than ocelli, nearly round, and hardly more than their diameter from the lower inner edge of eyes. Pronotum broader in front than behind, slightly convex on front margin, sides with several prominent rugae; wings rather long, about ten costal cross-veins, several beyond end of the subcosta; radial sector forked about the width of a cell beyond the anastomosis, four median cross-veins, four cubital cross-veins, and four branches of cubitus beyond. Female ventral plate evenly convex at tip. Length 12 mm.

Type.—♀. From Los Banos, Philippines (Baker).

Eusthenia costalis n. sp.—Black; a yellowish white fringe on base of clypeus and labrum; setae with yellowish hair. Wings beautifully violaceous, only indistinctly marked with pale around veins; a pale band beyond middle, the costal area reddish-yellow, but not as in *E. spectabilis*. The venation is as in *E. spectabilis*, but the wings are rather shorter than in that species; the recurved superior append-

ages of the male are slender and not widened at tip (in *E. spectabilis* they are widened at tip and acute on inner side). Expanse 43 mm.

Type.—♂. From Magnet, Tasmania (Lea).

Easily distinguished from *E. spectabilis* by the violaceous wings as well as by the male genitalia.

PSOCIDAE.

Myopsocus enderleini n. sp.—Related to *M. muscosus* Ender. from Japan. The markings of the wings are very similar, the dark spot on the union of the cubitus and the median is here larger and darker colored, the stigma is pale, with a few faint dark dots near the costa, and there are more pale spaces along the veins in the apical part of the wing. The antennae and legs are pale grayish; head brownish-yellow, unmarked. The venation is similar to *M. muscosus*, except that the stigma is a little more swollen at tip, and the outer side a little more oblique; the median cell is rather broader and the cross-vein from it to the hind margin shorter than in *M. muscosus;* the forking of the radial sector is also rather farther out than in that species. Length 5 mm.

Type.—♂. From Los Banos, Philippines (Baker).

MANTISPIDAE.

In 1910 Dr. Enderlein published an excellent classification of the Mantispidae, but in several points it can be improved. The length of the radial cells is of such a comparative character and so gradual in the variation from one species to another that it can hardly be used as a generic character; the number of branches of the radial cells varies in some species. *M. indica* is given by Enderlein as type of *Mantispilla* with but one branch from the first radial cell, and so figured by Westwood, yet in one specimen of the type series (in British Museum) the first radial (as others) has two branches. However I think that *Mantispa* may be divided according to whether the pronotum is hairy or not, and by this *Mantispa* and *Mantispilla* remain, but most of the species are transposed from one genus to the other. *Entanoneura* falls as a synonym of *Mantispilla*.

Dr. Enderlein separates *Anisoptera* and *Trichoscelia* also according to the number of branches to the first radial cell, *Trichoscella* having but two; yet in the type specimen of the genotype (*T. fenella*) there are two and a half, that is the

third is interstitial with end of the cell; and in other species this character is still more variable. Therefore the two genera should be united, and the *Anchieta* of Navas is also a synonym as Enderlein has already put it.

Ditaxis and *Drepanicus* are very close together, and perhaps identical; *Molinella* of Navas is the same as *Drepanicus*.

1. Front tarsi with one claw; front coxae divided more or less plainly into two parts.....MANTISPINAE–2.
   Front tarsi with two claws: front coxae entire.
   ANISOPTERINAE–5.
2. Second anal vein of fore-wings forked; cubitus in hind-wing not bent toward anal; radial cells long; pronotum short.
   Euclimacia.
   Second anal not forked ..... 3.
3. In hind-wings the cubitus bends down towards the anal, touching the anal or connected to it by a very short cross-vein..... 4.
   In hind-wing the cubitus does not perceptibly bend down toward the anal; radial cells long and with several branches to each.
   Climaciella.
4. Pronotum with hairs, not or barely wrinkled; antennae more than twice the diameter of the basal joint apart at base; pronotum very slender .....**Mantispa.**
   Pronotum without hairs, but very plainly transversely wrinkled; antennae not twice the diameter of basal joint apart.
   Mantispilla.
5. Prothorax closed beneath; three closed radial cells; front tarsus without spine near end ..... 6.
   Prothorax open beneath; two closed radial cells; front tarsus with spine above near end .....10.
6. Median vein of fore-wings united for a short distance with the radial sector; stigma barely longer than broad.
   Calomantispa.
   Median vein not united to the radial sector; stigma longer..... 7.
7. One series of gradate veins..... 8.
   Two series of gradate veins; many costal cross-veins..... 9.
8. The median vein of fore-wing appears forked, a long cross-vein from the fork to the cubitus; costal area narrow.
   Theristria.
   The cubitus of fore-wing appears forked, or rather a short cross-vein from fork to the cubitus; costal area normal.
   Gerstaeckerella.
9. Chilian species, green in color.....**Drepanicus.**
   Australian species, not green.....**Ditaxis.**

10. Prosternum distinct; hind tibia more or less thickened.
Anisoptera.

Prosternum not distinct; hind tibia not thickened.
Symphrasis.

In the type of *Drepanicus* (*D. gayi* Blanch.) the antennae are wide apart at base; the pronotum very short; costal area reaches to the stigma, and has twenty-five cross-veins, some of them forked; the radial cells long, the first with five branches, the second with two, and the third with five; the subcosta does not run into the radius at stigma but connected thereto by a short cross-vein; the costals beyond stigma are forked.

Mantispa chilensis Hag. is a *Gerstaeckerella*. The front femora are not much more swollen than in *Therestria*; the vertex is tumid; no branch from first radial cell, two from the second, three from the third.

Mantispa delicatula Westw. is a *Theristria*, the antennae are wide apart at base; the long spine on femora I is longer than the width of the joint; first radial cell with one branch, second with three branches; in the hind-wing cubitus not bent toward anal.

Ditaxis biseriata Westw. In hind-wings the cubitus is not bent toward anal; the antennae small and wide apart: vertex strongly tumid; hind tibiae long and slender; the pronotum coarsely wrinkled.

The species of *Anisoptera* in the Oxford Museum (Westwood's types) may be tabulated as follows:

1. Stigma of fore-wing about four times as long as broad; front legs all pale ..... 2.
   Stigma not more than three times as long as broad; front legs marked or dark 5,
2. Fore-wings with dark marks ..... 3.
   Fore-wings not with dark marks ..... 4.
3. A band before middle of the wing, and the tip dark; stigma yellow (fig. 41) ..... **fasciatella.**
   Two dark spots behind stigma; stigma also dark ..... **fenella.**
4. Veins black; stigma dark; smaller; first radial cell with two branches ..... **sequella.**
   Veins marked with yellow; stigma yellowish; larger; first radial cell with three branches ..... **iridella.**

5. Wings with dark spots; femora and tibia of front legs mostly black ..... 6.
   Wings without dark spots; femora and tibia mostly pale; stigma dark on base, pale beyond ..... 7.
6. Fore-wing with basal spot, band, and stigmal spot; hind-wings with basal band (fig. 23) .....**notha.**
   Fore-wing with long subcostal streak; hind-wings unmarked. **fumella.**
7. First radial cell with four branches; hind tibia with black spot above .. ..**partheniella.**
   First radial cell with but two or three branches..... 8.
8. Hind tibia with apical two-thirds black; larger species. **eurydella.**
   Hind tibia with faint dark cloud: smaller species.....**bella.**

Mantispa moluccensis n. sp.—Similar to *N. amabilis* Gerst. Yellowish, a dark mark on labrum, and a transverse mark on clypeus, a vertical mark between the antennae, aud a dark cloud above antennae; antennae, except pale basal joints, black, no annulus; femur 1 brown in middle and at apex on both sides; prothorax brownish, with pale line through the middle; thorax mostly dark, scutelli yellow; abdomen brown, some of the segments narrowly pale above at base; middle and hind legs pale yellow, tips of their tarsi brown. Wings hyaline; venation black; stigma reddish, nearly as long as width of wing, not enlarged; first radial cell with one branch, second and third with one or two, six costals Wings long and slender, cell beyond stigma much longer on costa than behind, next cell longer behind. Expanse 20 mm.

Type.—♂. From Amboina, Moluccas (Muir).

Mantispa alicante n. sp.—Yellowish; a rather broad vertical stripe on the face, and a transverse mark on the clypeus brown; vertex with median black mark, and faint dark marks each side; antennae pale, about three joints beyond middle black, then three joints yellowish, and the rest (about four joints) black; pronotum long, at the beginning of the narrow part is a faint swelling, but no tubercle, the anterior part is nearly smooth, but the long posterior part is covered with many minute, scabrous black points; this long part at about one-fourth before the end is wider than elsewhere; rest of thorax with broad black stripe each side, and pale through the middle. Abdomen blackish, the segments pale on the sides; venter pale. Legs pale yellowish, a brown line under middle and hind femora, front tibia blackish within, paler on outer side, with three faint dark spots near spines; about three tiny spines between the middle sized spines, the latter not one-third the length of the long basal spine; most of legs with minute dark dots, quite prominent on the front coxa and femur, Wings hya-

line, stigma blackish near tip, venation mostly dark, but the anterior veins, base of median and spaces elsewhere on the veins are pale; only six cells in the middle row. Expanse 23 mm.

Type.—♂. From Pusa, Bengal, India, June.

Mantispa greeni n. sp.—Pale; a brown stripe on the face, spot on the labrum, a spot on each side behind on vertex; antennae brown, basal joints pale, a pale band of three joints near tip; pronotum brown, thorax dark, a faint pale median line; legs pale, a brown line under femora II, femora I infuscated. Abdomen brown; wings hyaline, venation black, subcostal space and stigma brown, but a yellowish spot on apex of stigma, and a yellowish space just before it. In general structure like *M. indica*, the pronotum the same, and faintly transversely wrinkled. The wings rather long; the radial sector with six or seven branches, the marginal forks mostly with long pedicels. Expanse 22 mm.

Type.—♀. From Kandy, Ceylon, 12th June (Green).

Mantispa indica var. **spilonota** n. var.—Pale; brown stripe on face, spot on labrum, two or four spots on vertex; antennae dark brown, basal segments pale; pronotum brown, a pale transverse band across the swollen anterior part; meso- and metanotum brown, scutelli yellow, mesonotum with a yellow band and a broad yellow spot in front; pleura yellow, with two dark brown stripes. Coxae mostly black, rest of legs pale, except anterior femora which are more or less infuscated. Abdomen black, with clear yellow band on base of each segment, above and below. Wings hyaline, venation black, cubitus yellow at base, subcostal area and stigma brown. Structure similar to *M. indica*.

Type.—♂. From Kandy, Ceylon, 12th and 13th June (Green).

CALOMANTISPA n. gen.

Two claws to tarsus I; wings rather short, axillary vein forked, fore-wing with one complete series of gradate veinlets and one or two of a second (inner) series; stigma very short, not extending toward the base, two or three crossveins between subcosta and radius near base of wing. Head broad, face about twice as wide as eyes; antennae wide apart at base; pronotum short. Median vein of fore-wing united for a short distance to the radial sector.

This genus differs at once from all related Mantispidae by the very short stigma, as well as by the condition of the median vein of the fore-wings.

Calomantispa spectabilis n. sp.—Face yellowish: vertex black, leaving a little yellow each side; antennae black, a pale band of about three segments near the tip; pronotum reddish, black spot on middle behind; thoracic notum black, a pale spot each side on mesonotum, and fainter on metathorax; pleura with black, brown and yellow spots; abdomen with broad black stripe above on first five segments, then red for two segments, and apex black; below black is a yellow stripe, dark below this, and the venter is pale yellowish; legs yellowish, banded with with black, coxae with black spots, middle and hind femora black near base and at tip; hind tibiae mostly black; anterior coxae black at tips; femora mostly black, with two oblique pale stripes on outer side and pale below, tibia black at base, before middle, and at tip. Wings hyaline; basal part of fore-wings rather yellowish, extending out further below radius; venation, except basal part, black; stigma black, base yellowish; hind-wings like fore pair, except base is not yellowish so far out. Antennae rather flat, hairy, pronotum short, about twice as long as broad in front, with several transverse grooves and rather rugose with short black bristles. Venation as figured. Expanse 16 to 22 mm.

Type.—♂. From Herberton, Queensland, Australia, 9th January to 7th February (Dodd).

Some specimens show a dark spot below radius toward base.

Calomantispa spectabilis var. **nigrata** n. var.—Almost wholly black on body and legs; anterior coxae pale, and pale spots on front of mesothorax below; three segments of abdomen red above (instead of two); pronotum with triangular red spot in front, and red spot on middle of face; wings with base jet black extending out below radius to near middle of wing, beyond is a dark spot on hind border, a black cloud below stigma, and one on cross-vein before latter; hind-wings blackish at extreme base, and on middle of hind margin, and spot below stigma; stigma in both pairs black, otherwise as type.

Type.—♀. From Herberton, Queensland, Australia, 27th January, 5th February (Dodd).

Calomantispa spectabilis var. **maculata** n. var.—Body and legs mostly as in typical form, but more black; pronotum hardly black behind; femora I black, but with two oblique stripes outside, legs more black than in type. Abdomen black, with three segments red above as in *C. spectabilis nigrata*. Wings on base reddish for nearly one-half way out, except subcostal area; the red has two black spots on outer edge, and one below radius toward base; black mark below stigma, and one on middle of hind border of wing; hind-wing fuscous on extreme base, black mark below stigma and on hind margin near middle; in one specimen the lower black spot on the outer border of the red is extended basally in a band.

Type.—♀. From Herberton, Queensland, Australia, 20th January, 5th February (Dodd).

HEMEROBIIDAE.

The family may be divided into four subfamilies; the Dilarinae on account of female ovipositor and pectinate antennae of the male; the Psychopsinae on account of the union of the subcosta, radius, and radial sector; the Osmylinae on account of the union of subcosta and radius near tip of the wing, and the Hemerobiinae for the others.

Table of Genera of Osmylinae.

1. A distinct recurrent vein, giving off branches; cross-veins (except costals) without bristles; body thick and heavy; in fore-wings cubitus is forked near base, median a little way out (Polystoechotini) ..... 2.
   No recurrent vein..... 4.
2. With many cross-veins besides the gradate series; a large plantula between claws .....**Ithone.**
   Hardly any cross-veins except the gradate series..... 3.
3. Wings plainly falcate at tips.....**Ormiscocerus.**
   Wings hardly falcate af tips.....**Polystoechotes.**
4. Wings practically without cross-veins, except the gradate series... 5.
   Wings with many cross-veins besides the gradate series, and all bearing bristles..... 8.
5. Outer margin of fore-wings distinctly emarginate; cross-veins with bristles; hind-wings with a fork to cubitus that runs very close to the hind margin (*Berothini*) .... 6.
   Outer margin of fore-wings not emarginate; cross-veins not bristly (*Sisyrini*) ..... 7.
6. Radial sector at base connected to median; five branches to radial sector .....**Lomamyia.**
   Radial sector not connected at base to the median .....19.
7. Radial sector with three branches before stigma; no outer gradate veins.....**Sisyra.**
   Radial sector with but one branch before stigma; some outer gradate veins .....**Climacia.**
8. In hind-wings the cubitus has no fork running parallel to it. (*Nymphini*) ..... 9.
   In the hind-wing the cubitus has a long fork running parallel to it for a long distance (*Osmylini*)..... 14.
9. Beyond end of cubitus in the hind-wing are several rows of cells.....10.
   Beyond end of cubitus in hind-wing but one row of cells.....11.

10. In hind-wing two rows of cells between cubitus and hind margin. **Nymphes.**
    In hind-wing but one row of cells between cubitus and hind margin ..... **Nesydrion.**
11. Basal costal space narrow, the costals mostly simple, median forked toward base..... 12.
    Basal costal space very broad, the costals mostly forked; basal joint of tarsi very short, not longer than second ..... 13.
12. Basal tarsal joint not longer than the second..... **Osmylops.**
    Basal tarsal joint much longer than the second joint. **Spilosmylus.**
13.—In the fore-wings the median vein is forked near the base; one basal subcostal cross-vein; in hind wings a branch of the anal vein runs parallel to the cubitus for a short distance. **Nymphydrion.**
    In the fore-wings the median vein is not forked near base; several subcostal cross-veins ..... **Myiodactylus.**
14. Median vein of fore-wings forked near base..... 15.
    Median vein of fore-wings not forked till much beyond the middle, the empodia forked..... 17.
15. Fore-wings with outer margin plainly excised; ocelli present; empodia forked ..... **Kempynus.**
    Fore-wings not plainly excised on outer margin ..... 16.
16. No ocelli; empodia forked; wings slender..... **Osmylinus.**
    Ocelli present; empodia entire..... **Osmylus.**
17. Fore-wings with many subcostal veins; the cubitus and its fork strongly curved toward the tip..... **Porismus.**
    Fore-wings with only a basal subcostal cross-vein; the cubitus and its fork but slightly, if any, curved near tip ..... 18.
18. Median vein of hind-wings not forked near base; antennae very long; fore-wings rather slender..... **Gumilla.**
    Median vein of hind-wings forked near base..... 20.
19. Four or five branches to the radial sector..... **Berotha.**
    Eight branches to the radial sector..... **Isocelipteron.**
20. The median vein of fore-wings forks just above where the branches of cubitus turn down to go to the margin; the upper cubitus not there forked..... **Austrosmylus.**
    The median vein of fore-wing is not forked till further out, while the upper branch of the cubitus is forked at the turn. **Stenosmylus.**

NYMPHYDRION n. gen.

Wings very densely veined, and entire middle areas filled with cross-veins. Costal area of fore-wings very broad, the costals mostly forked, no recurrent vein; in hind-wings the cubitus has no fork running parallel to it, but there is a

branch of the anal vein running out some distance, beyond end of cubitus in the hind wing but one row of cells; in fore-wings one basal subcostal cross-vein. Pronotum extremely slender in front, almost pointed; legs with very long hairs; hind tibia very much longer than femora; all tarsi extremely short, basal joint no longer than second or third.

Type.—The following species:

Nymphydrion delicatum n. sp.—Pale; pronotum with a faint, darker median stripe; antennae with black hair; scutelli and anterior lobes of both meso- and metanotum blackish; abdomen with black spot above on each segment. Wings hyaline; fore-wings with five black clouds, four of them on origin of four branches of radial sector, and one on the stigma; a fainter dot behind stigma, and one on origin of first branch of the radial sector, and another on the last veinlet connecting the radial sector and radius, near tip of wing. Venation pale, a number of cross-veins partly dark, and the forkings of costal veinlets dark; a reddish spot at extreme base of costal area. Hind-wings with entirely pale venation, except on the stigma is a faint mark, and one on last connecting veinlet between radius and radial sector, and a faint reddish dot at base of costal space. Apex of both wings acute; in shape like *Nesydrion;* a few cross-veins beyond end of radial sector in both pairs. Expanse 55 mm.

Type.—♀. From Herberton, Queensland, Aus. (Dodd).

Nesydrion pallidum n. sp.—Pale yellowish; a median black spot on face, a black line between antennae, vertex with two dark longitudinal stripes, connected in front to a shorter, median black line, behind with a black spot each side; antennae brown, with short black bristles; pronotum pale, with a faint broad stripe through middle; thorax and legs pale; abdomen brownish above and toward the tip. Body and legs with long white hair. Wings hyaline; venation wholly pale yellowish, stigma hardly indicated, some veins, in certain lights are darker. Wings long, about the shape of *N. diaphanum*, but the costals more numerous; radial sector in hind wings arises nearer base than in that species, and the hind wings are rather broader in the middle, so that a number of the veinlets from median are forked three times before margin; in both wings the radial sector has ten branches. Expanse 65 mm.

Type.—♀. From Herberton, Queensland, Australia, 5th February (Dodd).

OSMYLOPS n. gen.

Differs from *Myiodactylus* in the narrow costal area of fore-wings, practically all the costals being simple; more densely veined than in *Spilosmylus*. There are no ocelli, but a flat tubercle somewhat resembles one. In hind-wing the cubitus has no long fork running parallel to it, and beyond the end of cubitus are several rows of cells. The tarsi are very short, the first tarsal joint no longer than second or third, the legs very fairly densely haired.

Type.—Myiodactylus placidus Gerst. Includes also *Nymphes sejunctus* Walk.

SPILOSMYLUS Kolbe.

Type.—Osmylus africanus Kolbe.

Lysmus Navas is a synonym of this genus.

Spilosmylus triseriatus n. sp.—Pale; vertex rather darker behind; pronotum dark in front; abdominal segments dark on tips. Wings hyaline; venation pale, marked with black; radius and subcosta each with five black streaks and at the same places are five black lines in the subcostal area (as McLachlan describes for his *O. interlineatus*); many costals with dark spot before margin, many cross-veins in basal middle part of wing are wholly dark, fewer near tip; a dark dot on the yellowish stigma; on hind margin beyond end of cubitus (in male) is a large flat, rounded, yellowish tubercle, with six black spots on its edge, and the veins across it dark. Venation of hind-wings almost wholly pale, but the outer gradates and some inner cross-veins are dark. Expanse 35 mm.

Type.—♂. From Herberton, Queensland, Australia, 30th January, 3000 feet (Dodd).

OSMYLINUS n. gen.

In general similar to *Osmylus*, but the empodia are forked; there are no ocelli, although there are some smooth tubercles the costal cross-veins are more numerous than in *Osmylus*.

Type.—Osmylus longipennis Walk.

KEMPYNUS Navas.

Venation as in *Osmylus*, but empodia deeply bilobed, and the outer margin of fore-wings is plainly excised; the costal cross-veins are very numerous and often forked; the median vein of fore-wings forks beyond the origin of first branch of the radial sector; ocelli present.

Type.—*Stenosmylus incisus* McLach. Includes also *St. citrinus* and *St. stellae.*

AUSTROSMYLUS n. gen

Similar to *Stenosmylus*, but the median vein is forked as stated in the generic synopsis, while the cubital branches are simple; ocelli present; empodia forked; costals very numerous.

Type.—*Osmylus pulverulentus* Gerst.

STENOSMYLUS McLach.

Type.—*Osmylus tenuis* Walk. Includes also *O. pallidus*, *St. stenopterus* and *Nymphes extraneus* Walk.

OSMYLUS.

Dictyosmylus and *Hyposmylus* are based on the same character, the crossed costals; but this is variable, and several species described in *Osmylus* have one or two costals crossed. *Parosmylus* was based on the presence of a spur on coxa I, this spur is present in the types of *Hyposmylus* and *Dictyosmylus*, also in *Osmylus nubeculosus* (Paris Museum) which is apparently the same as *D. lunatus*. Moreover this spur is present in the female of *Osmylus maculatus*, the type of *Osmylus*. *O. punctipennis* Walk. is a *Hyposmylus*, and has the spur on coxa I. Therefore since the characters used for these genera break down I consider they are synonyms of *Osmylus*, at least until better characters are presented.

Sisyra bakeri n. sp.—Head clear yellow, vertex with a dark cloud on middle, three basal joints of antennae yellow, rest dark brown; thorax and abdomen brown; legs clear yellow, unmarked; wings nearly uniform dark brown, darker on costal area and at tip. In fore-wings eleven costal cross-veins, the last two widely separated, radial sector with three branches, and connected back to the radius three times, a cross vein from base of second branch of radial sector to the first branch of radial sector; the apical forks of radial sector and its first branch are of equal length; the cubito-anal cell is hardly three times as long as broad. In hind-wings the apical forks of the radial sector and of its first and second branches are all of equal length. Expanse 8 mm.

Type.—♂. From Los Banos, Philippine Islands (Baker).

HEMEROBIINAE.

In the following table are included all the genera known to me at present; but I am aware that there are others as yet undescribed in several collections. It is quite probable that some of these may be united later, as the number of radial sectors and some other characters used to separate them are hardly sufficiently constant to be relied upon for generic separation.

1. No recurrent vein at base of fore-wings..... 2.
   A recurrent vein present..... 9.
2. Fore-wings coriaceous, divided up by numerous cross-veins into little squares; hind-wings absent .....**Nesothauma.**
   Fore-wings not coriaceous, nor densely reticulate..... 3.
3. Fore-wings with three or more radial sectors, and two or three rows of gradates..... 4.
   Fore-wings with but two radial sectors ..... 6.
4. Outer margin of fore-wing excised.....**Nesomicromus.**
   Outer margin entire..... 5.
5. Hind wings rudimentary.....**Pseudopsectra.**
   Hind-wings normal; the branches of upper cubitus in hind wings run into a vein parallel to hind margin.....**Micromus.**
6. No gradates in fore-wings, no cross-veins in hind-wings. **Sisyrella.**
   Some gradates in the fore-wings .... 7.
7. Costals mostly simple; cubitus in fore-wings not forked near the base ....**Neurorthrus.**
   Costals mostly forked; the cubitus in fore-wings forked near base..... 8.
8. Several outer gradate veins; body and legs very hairy; female with a short ovipositor.....**Nosybus.**
   No outer gradates in fore-wing; no ovipositor; hind wings often rudimentary.....**Psectra.**
9. Basal part of wing reticulate; costal area reticulate; cross-veins between radius and subcosta numerous .....**Gayomyia.**
   Basal part of wing not densely reticulate .....10.
10. No series of cross-veins in the hind-wings; but two radial sectors .....11.
    A series of cross-veins in hind-wings.....12
11. Fore-wings with four preapical cross-veins .....**Symplherobius.**
    Fore-wings with but one preapical cross-vein.....**Notiobiella.**
12. But one radial sector with several branches; cross-veins numerous and irregular.....13.
    Two or more radial sectors; cross-veins in more regular series...14.

13. Costal area very broad, costals crossed ; median fork not running into the cubitus.....**Rapisma.**
Costal area rather narrow, costals not crossed ; median fork runs into the cubital vein .....**Oliarces.**
14. Outer margin of fore-wings plainly excised ; five or more radial sectors.....**Drepanepteryx.**
Outer margin not plainly excised.....15.
15. A connecting veinlet between the first radial sector and the median before middle of wing, above the cross-veins from cubitus to median and to anal, thus forming a basal gradate series..... 17.
No such connecting veinlet, but often one from median to radius before the origin of the first radial sector.....16.
16. At least five radial sectors ; wings very broad.....**Megalomus.**
From two to four radial sectors ; wings much narrower.
Hemerobius.
17. Six or more radial sectors ; wings very broad ; three gradate series.
Neuronema.
Not more than four radial sectors.. .....18.
18. But one series of gradates beyond middle of fore-wings.
Carobius.
Two series of gradates beyond middle of fore-wings .....19.
19. Fore-wings plainly acute at tip ; each radial sector connected three times to the next.....**Megalomina.**
Apex of fore-wings rounded.....20.
20. Outer gradate series reaching obliquely backward to before middle of hind margin.....**Psychobiella.**
Outer gradate series not reaching back to middle of wing.
Boriomyia.

Sartena=**Neurorthus.**
Stenolomus=**Megalomus.**
Nemis=**Micromus.**
Hemerodomia and *Niremberge*=**Boriomyia.**
Annandalia=**Notiobiella.**
Spadobius and *Palmobius*=**Symplherobius.**

GAYOMIA n. gen.

Distinguishable from other Hemerobiidae by the densely reticulate basal and costal parts of wing ; many cross-veins elsewhere quite irregular ; recurrent vein present ; many cross-veins between the radius and subcosta in fore-wings ; in fore-wings at least five radial sectors, the fifth with five or more branches ; in hind-wings with two radial sectors, the first running up to the second and then away, and with

one branch, the second with six branches; hind wings with two gradate series.

Type.—Megalomus falcatus Blanchard; *M. sticticus* Blanchard also belongs to the genus; both are from Chili.

RAPISMA McLachlan.

This is the largest Hemerobiid, green in color; the antennae are fully two diameters of basal joint apart; costals crossed and forked; many cross-veins on wings not arranged in regular series; but one radial sector, which has seven branches; in both wings the median vein soon forks, and the cubitus forks near base. There is a brownish specimen in the old Westermann collection which may be a new species.

SISYRELLA n. n.

Nopia Navas, 1911 (nec Walker, 1862).

Type.—Nopia nikkoana Navas.

NEURONEMA McLachlan.

The type species has seven radial sectors, the first forked, next five simple, the last with five branches; in hind.wings two radial sectors, the second with nine branches. The costal area of fore-wings is very broad and the costal cross-veins are forked; in fore-wings three series of gradate veinlets, in hind wings two series of gradates. It is related to *Drepanepteryx*.

Hemerobius greeni n. sp.—Yellowish; dark brown stripe under each eye toward the mouth, sides of pronotum brown, abdomen brownish. Wings pale, lightly infuscated by narrow irregular bands across veins, brown dots and streaks on veins, more prominent spots at origin of the three radial sectors, and on veinlet connecting median and cubitus and reaching downward along cubitus, gradate series dark, outer margin with dark dots in groups of three or four. Venation of hind wing mostly pale, gradates dark, and some veins beyond them, and a few dark veinlets near end of anal vein. Fore-wings moderately broad, about as in *H. humuli*, three radial sectors, inner gradate series quite regular, of six or seven veinlets, the last a trifle nearer base than the preceding one; outer gradate series of about seven, rather irregular, and connecting the branches beyond the forks; hind wings with about six gradates in outer series. Male appendages furcate, superior process acute curved toward the other appendages.

Type.—♂. From Pattipola, Ceylon, 21st May (Green).

Notiobiella mexicana n. sp.—Yellowish; third joint of antenna dark brown; pronotum slightly dark on front border. Wings with most of the forks dark, and the gradates and some other cross-veins dark brown, and a spot at the origin of the first radial sector; stigma pinkish or yellowish. Pronotum very much narrowed in front; wing nearly two and a fourth times as long as broad, first sector arises near the base, the second beyond the middle of wing, and with two branches; stigma of hind-wings dark at base, not much swollen on costa, radial sector with two branches quite close to each other at their origin. Expanse 16 mm.

Type.—♂. From Guadalajara, Mexico (McClendon).

Notiobiella affinis n. sp.—Closely related to *N.* (*Hemerobius*) *iniquus* of Ceylon. Pale yellowish, marked with brown; last joint of palpi brown; pronotum dark brown each side leaving a narrow pale median s;ripe; rest of thorax with pale brown spots; legs pale yellow; wings yellowish hyaline, the veins with pale brownish spots and a large dark brown trifid mark near base as in *N. iniquus;* the gradates are marked with a faint brown cloud. In fore-wings the fork of the second radial sector is as far out as the fork of the radius just above it (in the *N. iniquus* this fork is much longer). In hind wings the veins near margin and beyond middle of wing are marked with brown. Six veinlets In the middle gradate series of the fore-wings, the third farther out than the second; fore-wing about two and a fourth times as long as broad. Expanse 10 mm.

Type.—♀. From Manila, Philippine Islands.

Notiobiella viridinervis n. sp.—Green; head yellowish-green; antennae yellowish; legs greenish-yellow, hind tibia with two dark green narrow bands close together near the middle; tips of palpi brown. Wings hyaline, venation green, a faint cloud near hind margin near end of the anal vein. Wings about two and a fourth times longer than broad, costal area at its broadest about one-third of the width of wing; two radial sectors far apart, the first near its base connected to median, and the second near its base connected to the first. One gradate series near middle of wing of four veinlets; median and cubitus connected three times, once at the gradate series; stigmal area has veinlets closer together than elsewhere. In the hind-wings the stigmal area is swollen on costal margin. The pronotum is much broader behind than in front, with an oval area each side behind the middle, marked by deep furrows: antennae about as long as width of wing; male appendages very large, subtriangular plates. Expanse 14 mm.

Type.—♂. From Trincomali, Ceylon, 4th September (Green).

Dilar hermosa n. sp.—♀. Pale, head dark on vertex, dark spots on sides of the pronotum, also on the meso- and metanotum; abdomen swollen, each segment with transverse brown spots bearing tufts of hairs; legs very hairy, especially tibia I. Wings with numerous transverse pale brown marks, those in middle apical part rather smaller than elsewhere, and more connected; about ten or eleven costal spots; two large ones just before middle of the wiug, one behind radius and almost connected to the one on the hind margin, before them a transverse band devoid of spots; hind wings (besides numerous other spots) with three along the inner margin, and about seven in costal area. Wings very broad, outer margin of both pairs hardly excavate in middle, costal cells three or four times as long as broad, many costals forked, but some simple ones here and there; radial sector connected to radius three time before apical third; six branches of radial sector in fore-wings, five in hind wings; a black dot between first and second branches in both wings; in fore-wings upper branch of cubitus with three or four branches; in fore-wings the branches of radial sector are bifurcated or a few trifurcate before the marginal forks, in hind-wings some are bifurcate others simple; entire margin of both pairs with short intercalated veinlet between all other veins; margins of wings and the veins with long hairs, the posterior fringe is extremely long. Expanse 25 mm.

Type.—♀. From Pacho, Colombia, E. Cordilleras, 2200 m., October (Fassl). It belongs to the subgenus *Nallacius* of Navas.

CONIOPTERYGIDAE.

Malacomyza terminalis n. sp.—Densely clothed with white powder, cilia white. Antennae white on basal seven joints, beyond deep black; palpi black on base, white on last joint; body brownish, with white powder. Fore-wings with cross-vein just before fork of the median vein; radial sector geniculate at base; in hind-wings but one fork. In the male the antennae are thick, the basal joint enlarged at tip, and seen from the side with concave upper edge; on the head of male is a swollen cap or top piece; in the female the head is normal, and the basal joint of antennae long, but not enlarged at tip; legs with fusiform tibiae. Expanse 4 mm.

Type.—♀. From Belgaum, Bombay Province, India, 12th August, 2500 feet.

CHRYSOPIDAE.

Chrysopa zeylanica n. sp.—Yellowish; face with a prominent brown inverted Y-mark, the stem going up between the antennæ on the vertex, the forks reaching down to clypeus; a dark spot under each eye; palpi mostly dark; antennae pale, basal joint with brown stripe on outer side and one on the upper side; second joint pale, but

the next four or five joints nearly black; pronotum nearly twice as broad as long, hardly narrowed in front, with broad brown stripe on each side margin continued back on rest of thorax above the base of wings, a brown spot on each side of scutellum; abdomen dark; legs pale, extreme tip of tarsi brown. Wings pale, veins mostly pale; costals dark at ends, many marginal veinlets dark, on outer margin alternating with the pale veins; an oblique streak across the costal area near base; the gradate series and the cross-veins between radial sector and radius faintly margined with brown; base of radial sector and the cross-vein to median vein black, the stigma also dark, but short; a dark spot in the fork of the cubital branch. Hind-wings with some costals and most of the marginal veinlets dark, stigma dark, and a very dark spot over origin of radial sector, a cloud below stigma, and a larger cloud behind it on the hind margin. Wings slender, acute at tip, cells large and few; four inner gradate veinlets, six outer, inner series twice as near to outer as to the radial sector; eight cross-veins between radius and the radial sector; divisory veinlet of the third cubital cuts off only a very small cell. In hind-wings the inner gradate series of three, and outer of five veinlets. Expanse 24 mm.

Type.—♂. From Kandy, Ceylon, May (Green). In general appearance similar to *Ch. conradtina* Navas.

Nothochrysa aequalis Walk.—Face yellowish; antennae black, except the basal two joints reddish-yellow; anterior margin of vertex rather reddish, rest yellowish; thorax yellowish, pronotum much broader than long, anterior margin very strongly convex, a median groove, color yellowish, with anterior margin dark brown, and a broad brown band across over the transverse furrow; anterior lobe of mesothorax black in front, lateral lobes with black spot, and some black in the middle before the scutellum; metathorax dark, but with two pale submedian approximate spots. Abdomen dark at base, beyond pale, spotted with dark, the segment near tip each with an apical median and lateral dark spots; ventral segments banded with dark; legs pale, all femora with preapical blackish band, that on hind femora very broad. Wings long and slender, hyaline, with yellowish venation, unmarked, and long greenish stigma; about 10 veinlets in each gradate series. Length 22 mm.

From Chapra, Bengal, India (Mackenzie).

MYRMELEONIDAE.

Brachynemurus fenestratus n. sp.—Yellowish; a median dark dot on the face, dark mark below each antennae, a large dark mark above antennae, not sharply defined, vertex with two dark marks each side; tips of palpi dark; antennae short, strongly clavate, annulate. Pronotum much longer than broad, with two dark dots on the front margin, and a stripe each side much broader behind; thorax with

spots and streaks on sides, but the scutelli wholly pale. Abdomen pale on base, blackish beyond middle, not longer than the wings in either sex, in male the last segment is very short, not nearly as long as the long and slender appendages. Legs pale, with dots at base of the black bristles; anterior femora dark above near tip; spurs but little longer than the first tarsal joint. Wings hyaline; longitudinal veins interruptedly marked with white and black, the cross-veins all strongly dark and most of them almost margined with dark, so they are very prominent; a dark spot at base of stigma, and another at the end of the cubitus in both pairs; apical, submarginal forks slightly darkened. Wings moderatly broad; four to six cross-veins before radial sector in the fore-wings, three or four before radial sector in hind-wings, eight branches of the radial sector in both pairs; a few costals before stigma forked; cubitus forks before the first branch of radial sector; in fore-wing the anal runs out parallel to the hind margin for nearly one-third of wing length; venation generally very dense. Expanse 55 mm.

Type.—♂. From rice fields Turricares, Costa Rica, December (Tristan).

INDOLEON n. gen.

Wings long and subfalcate at tip; costals simple; radial sector arises much beyond the cubital fork, ten cross-veins before it, one in the hind-wing before radial sector; no line of bent veins through apex of wings. Antennae long, not diameter apart at base; pronotum slender; legs slender, spurs little longer than the first tarsal joint, fifth tarsal joint longer than the first.

Type.—*Myrmeleon tacitus* Walk. Probably includes also *Myrmeleon insignis* Rambur, which also has ten cross-veins before radial sector in fore-wings. This genus is allied to *Episalus* and *Periclystus*, but differs in that the radial sector arises much farther out, and no line of bent veins in apex of wing.

Myrmeleon berenice n. sp.—Face yellowish, a large interantennal mark black, vertex with two transverse rows of three dark spots, the middle one of the front row double; pronotum pale, with three dark stripes, the lateral sometimes incomplete, meso- and metanotum mostly dark, but pale behind, pleura partly pale, legs pale, hind tibia dark within, other tibiae and tarsi sometimes infuscated; abdomen dark, sides with pale stripe, tips of segments narrowly pale. Wings hyaline, veins pale, indistinctly dotted if at all, subcosta with dark spaces, stigma pale. Pronotum broader than long, a little nar-

rowed in front, anterior corners rounded. Tibial spurs not as long as first tarsal joint, middle tarsal joints not very short, the second but little shorter than the first. Wings long, slender, acute at tips; radial sector of fore-wings arises near middle of wing, beyond end of the anal vein, about 12 cross-veins before radial sector, in hind-wings about 8 cross-veins before sector, in both wings with 9 branches to radial sector; about 37 costals before stigma, all simple. Expanse 50 mm.

Type.—♂. From Trincomali, Ceylon, 4th September (Green).

Myrmeleon clothilde n. sp.—Yellow; head with large black interantennal mark, and covering vertex, latter shows two pale spots behind, and a fainter transverse spot each each side on top; basal joint of antennae pale above; pronotum dark, anterior lateral corners pale, and perhaps a pale mark on each side; thorax dark, bordered behind with pale; abdomen dark, legs pale, femora dark on tips or apical half, tibiae black within, tarsi black, paler on bases of joints. Wings hyaline, all cross-veins pale, dotted with dark; most of the longitudinal veins with dark spaces, stigma faintly dark. Pronotum very broad, but little narrowed in front. Tibial spurs a little longer than first tarsal joint, middle joints very short, fifth as long as second, third and fourth together; wings long and slender, acute at tips, about 7 cross-veins before radial sector in fore-wings, about 5 in hind-wings; 9 branches to radial sector in both pairs; hind-wings with costal margin swollen near base; about 45 costals before stigma in fore-wings, only one or two forked. Expanse 64 mm.

Type.—♂. From Pusa, Bengal, India, June.

COMPSOLEON n. gen.

Antennae diameter apart; pronotum twice as long as broad. Legs slender, tibia about as long or longer than femora; no spurs, basal tarsal joint longer than the second, fifth equal to third plus fourth. Wings slender; hind wings longer than the fore-wings; in hind-wings one cross-vein before the radial sector, in fore-wings four such cross-veins; costals simple; a single series of anal cells.

Type.—*Myrmeleon occultus* Walker.

GLENOLEON n. gen.

The radial sector arises before the fork of the cubitus in fore-wing; three cross-veins before radial sector in fore-wing, one in hind-wings; in hind-wings the anal does not run parallel to cubital fork, but bends down to margin, or

up to the fork. In the median apical part of fore-wings the veins tend to form a straight line; legs slender, spurs as long as two joints.

Type.—Glenurus pulchellus Walk.

I erect this genus for the Australian species of *Glenurus*, which differ much from the American species, especially in position of radial sector, and in the apparent straight line in apical part of wing.

The species I have seen may be tabulated as follows:

1. Two complete bands across hind-wings.....**pulchellus.**
   Not two complete bands ..... 2.
2. Hind-wings with distinct black spots..... ..... 3.
   No distinct spots, only minute dots .....**indecisum.**
3. In hind-wing four cross-veins below radius are marked with black, also spot at stigma and spot opposite on hind margin. **radialis.**
   No marks along radius on hind-wing..... 4.
4. Hind-wings with large spot beyond stigma and a band (perhaps broken) before.....**dissolutus.**
   No spot beyond stigma, but one before..... 5.
5. No spot or cloud in hind-wing except the spot by stigma. **stigmaticus.**
   Besides the stigmal spot, a cloud or broken in two spots, wings narrow .....**falsus** (*meteoricus*).

Glenoleon radialis n. sp.—Head pale, a large interantennal black mark, which is connected on the middle below to a large transverse dark spot on clypeus; vertex dark, darker margined in front, and behind showing as three transverse spots; pronotum dark with faint median and lateral streaks, thorax dark, marked with dark gray, and with some pale spots; abdomen black; legs with black femora, tibia with apical black band, and fore and middle tibiae with median and sub-basal bands also; basal part of first tarsal joint pale, rest black, spurs longer than first joint. Wings hyaline; venation marked with dark streaks, the cross-veins not dotted, but either all or partly black, or all pale. In fore-wings there is a dark spot at the stigma, and small spots beyond it along the costa; behind the radius are five dark spots, four on cross-veins, the other on origin of radial sector, one of the marked cross-veins is before the radial sector; also a spot at inner base of stigmal spot; about eight or ten cross-veins between medius and cubitus are broadly margined with black; an oblique mark at the union of median and cubital veins, and two oblique streaks from near this mark to the hind margin; an oblique streak up from end of anal vein, and a number of other cross-veins dark, and

dark dots in apical part of wing. In hind wings the origin of the radial sector and four cross-veins beyond are broadly margined with dark, the last under the dark stigmal mark, behind the stigmal mark is a larger mark on the hind border and beyond this is a streak and several subapical spots. Wings rather broad, especially at the stigma, fully as broad as in *G. pulchellus;* the costals, except a few near stigma, almost all simple; ten branches of radial sector; in fore-wings the anal is connected four times to the fork of cubitus, in hind-wings only once or twice. Expanse 74 mm.

Type—♀. From Port Darwin, Australia, 12th May (Dodd).

Glenoleon indecisum n. sp.—Face pale; a broad shining black band below and another above the antennae, vertex dull black, leaving pale band between it and the band above antennae; antennae pale, darker on tip; pronotum dark, a pale line through the middle, and less regular pale stripe each side; rest of the thorax blackish, marked with dark; pleura pale, with a broad black stripe under the wings; legs pale, femora I banded near middle and tip, femora II and III at tip; tibia I with broad band near base, tibia II mostly dark, tibia III faintly dark at tip; tarsi I and II black, except base of first joint, III mostly pale. Abdomen dark, with pale spot before middle of segments. Wings hyaline, venation black, with long white streaks, the subcosta with short black and white spaces; some cross-veins wholly or partly pale; about four dark spots in subcostal area, and one below radius near stigma, one on stigma; outer gradates clouded to form a rather irregular oblique streak, fork of cubitus and several spots beyond dark, and smaller spots especially along the outer border of wing. Hind-wings with spots along outer and apical border, and on the last two veinlets connecting radius and radial sector. Structure similar to *G. pulchellus*. Antennae long, slender, pronotum longer than broad; legs slender, tarsi and the claws and spurs as in *G. pulchellus*. Hind-wings narrower and as long as fore-wings; most of costals in fore-wing (except basal ones) forked; three cross-veins before radial sector, in hind-wings one before radial sector, ten branches to radial sector in each wing; in fore-wings there is no apparent curved vein bending up from the fork of cubitus where the anal runs into the cubital fork (present in *G. pulchellus*). In the hind-wings (being narrower) the anal runs out farther than in *G. pulchellus* and there is not so much space between the cubitus and the hind margin; the tip of the wing is also more nearly falcate than in *G. pulchellus*. Expanse 37 mm.

Type.—♀. From Herberton, Australia, 5th and 8th January (Dodd).

The genera of Myrmeleonidae known to me to occur in South America may be tabulated as follows:

1. In the hind-wings the cubitus is not distinctly forked, the anal bending up runs out in a long curve; palpi very long and slender; antennae well separated at base.....**Dimares.**
   In hind-wings cubitus is plainly forked, and anal makes no long curve outward..... 2.
2. In hind-wings but one cross-vein before the origin of the radial sector ..... 3.
   In hind-wings two or more such cross-veins ..... 9.
3. In both wings the fork of cubitus is parallel to it, and anal to both cubitus and its fork; first tarsal joint barely longer than the second, spurs very short.....**Dimarella.**
   Forks of cubitus divaricate, anal not parallel thereto..... 4.
4. Many costals of fore-wings crossed; radial sector arises before cubital fork; spurs but little longer than first joint.....**Puren.**
   Few if any costals crossed, some forked near stigma..... 5.
5. Basal joint of tarsus but little longer than the second; femur I rather thick; spurs about as long as two tarsal joints. **Psammoleon.**
   Basal joint much longer than second; femur I slender; spurs long, often one-half the length of the tarsus..... 6.
6. In hind-wings the cubitus has many equal branches direct to margin..... 7.
   In hind-wings every other branch of the cubitus is heavier and runs for a distance parallel to the hind margin; hind-wings longer than fore-wings.....**Glenopsis.**
7. Pronotum longer than broad; wings quite broad in stigmal region; hind tibia longer than hind femur..... 8.
   Pronotum broader than long; wings slender; hind tibia not longer than hind femur; costal area narrow .....**Incamoleon.**
8. Fore-wings broadest at stigma; costal area very broad, one or both pairs marked; an oblique vein up from end of anal in fore-wings.....**Glenurus.**
   Fore-wings broadest before stigma; costal area very narrow. **Eremoleon.**
9. No spurs; small, delicate species; anal of fore-wing ends beyond middle; wings broadest at stigma .....**Mimoleon.**
   Spurs present.....10.
10. Two or more series of cells in costal area.....11.
    Costals simple, or forked near stigma.....13.
11. Spurs strongly curved; legs thick and hairy; a line in apex of wing; antennae well separated.....**Acanthaclisis.**
    Spurs but little curved; legs moderately slender..... 12.

12. Two series of costal cells for most of distance in fore-wing; in hind-wing but one series.....**Lemolemus.**
    Three series of cells in fore-wing for part way, and two in hind-wings.....**Calinemurus.**
13. In hind-wings anal runs parallel to the cubital fork for a long distance; a line in apical part of both wings, and between the cubitus and the hind margin; antennae more than their diameter apart.....**Ameromyia.**
    In hind-wings the anal does not run parallel to cubital fork for any considerable distance, often not more than one or two cross-veins between them .....14.
14. Antennae more than their diameter apart at base; usually four cross-veins before radial sector in hind-wings.....15.
    Antennae not diameter apart at base; first branch of radial sector at or before the end of anal vein in fore-wings.....16.
15. No line in apical part of the wings, but one between the cubitus and margin in fore-wings; first branch of radial sector arises much beyond the end of the anal vein; spurs not much longer than first tarsal joint.....**Myrmeleon.**
    A line in apex of both pairs of wings; spurs as long as two tarsal joints; first branch of the radial sector arises opposite the cubital fork.....**Amazoleon.**
16. A comb of long bristles on the outer posterior edge of coxa I. **Austroleon.**
    No such comb of bristles .....**Clathroneuria.**

Puren Navas.—This includes *Myrmeleon modestus* Blanch. which agrees closely with *P. bellator* Navas and probably is the same species; there are three cross-veins before radial sector in the fore-wing.

Calinemurus Bks.—*Elicura* Navas agrees with this genus.

Lincoya Navas.—This generic name has long been preoccupied in Zoölogy; but the genus is perhaps the same as *Austroleon*.

Lemolemus Navas.—It is possible that this is the same as the North American *Brachynemurus*, at least I do not know at present how to separate them.

AMEROMYIA n. gen.

Differs from *Myrmecaelurus* in that in both wings the anal runs parallel to the cubital fork for a considerable distance; first branch of radial sector arises a long distance before end of anal vein, two or three cross-veins before radial sector in hind-wings, three or four in front-wings; costal series simple;

a line in apical part of wings and between cubitus and hind margin; spurs present, rather short; fifth tarsal joint as long as second, third and fourth together; antennae widely separate at base.

Type.—Brachynemurus strigosus Banks. This genus includes also *Myrmeleon nigriventris* Walker, which I have seen from Argentina and redescribe it as follows:

Ameromyia nigriventris Walker.—Head yellowish-brown, two black spots on the clypeus, a black mark above the antennae up on front of vertex, latter paler, with black marks, a round black spot each side, a submedian pair, and a spot near each eye; antennae brown, darker toward tip, fully diameter apart at base; pronotum with a broad dark median stripe, narrowly divided in middle by a pale line, a dark stripe on each posterior side; thorax densely spotted and streaked with black, and with yellowish marks, a narrow median pale line over mesothorax; pleura with a broad white stripe under wings, below which it is dark brown or blackish. Legs pale yellowish, femora minutely dotted with black, bristles black, spurs as long as two joints of tarsus; abdomen dull black, with white hair. Wings hyaline, tinted with fuscous along base, and in subcostal and radial area; about eight black spots along lower edge of radius, from radial sector out to the stigma, latter black; about seven smaller black spots along upper edge of the cubitus, the last at the anastomosis; the veins at these black spots are black, elsewhere pale, other veins more or less marked with black, radial sector mostly dark. Hind wings tinted with dark on basal subcostal space; a few small dark spots along radius; the stigma dark, and a very plain black streak in the apex of wing; venation mostly dark, but the subcosta and radius interrupted with pale. Wings rather narrow, both pairs subfalcate and acute at tips; in fore-wings four cross-veins before the radial sector, in hind-wings three; about thirteen branches to radial sector in each wing; in fore-wings the radial sector arises much before the cubital fork, the latter runs nearly parallel to cubitus for some distance, as also does the anal vein, which ends far out in both pairs; through the radial branches is a straight line toward tip of wings in both pairs. Expanse 60 to 70 mm.

From Misiones, Argentina, also Rio Grande do Sol, Brazil.

In structure similar to *B. strigosus*, but the markings are very different. I would not have known this was Walker's species but for a sight of the type.

INCAMOLEON n. gen.

Pronotum broader than long; legs moderately slender, but hind tibia not longer than hind femur; spurs long and slender; wings slender, costal area narrow; one cross-vein before radial sector in hind-wings, the anal runs direct to hind margin.

Type.—Psammoleon punctipennis Bks.

MIMOLEON n. n.—I propose this for my *Microleon* which is preoccupied by Butler in 1885.

GLENOPSIS n. gen.

In general similar to *Glenurus*, but wings much more slender, and the hind wings plainly longer than the front pair; in the hind-wings every alternate branch of the cubitus is heavier than the others and is bent to run parallel for a short distance to the hind margin.

Type.—Myrmeleon anomalus Rbr.

Glenurus mollis Gerst. is the same species.

AMAZOLEON n. gen.

Antennae wide apart at base; spurs as long as two tarsal joints; first tarsal joint barely longer than the second, which is equal to the third plus fourth; no comb of bristles on coxa I; wings long and narrow; costals simple; a line through the apex of both pairs; three or four cross-veins before radial sector in both wings; in hind-wings the anal runs parallel to cubital fork for only a short distance; abdominal segments near tip swollen.

Type.—Myrmeleon pubiventris Walk.

DIMARELLA n. gen.

Antennae separate at base, about as far from each other as from the eyes; legs very long and slender, tarsi long, all joints several times as long as broad, second joint as long as first, fifth the longest, as long as third and fourth together, beneath with stiff bristles; claws long, but little curved; spurs weak, not as long as basal tarsal joint; pronotum about as broad as long. Wings slender, hind-wings very narrow: radial sector of fore-wings arises beyond the basal third, about seven cross-veins before it; anal, instead of running direct to margin, bends up and outward and runs

parallel to the cubital fork until middle of wing. The fork of cubitus parallel to cubitus, but one vein between them; costals simple; hind-wings with radial sector arising near base, but one cross-vein before it; anal extremely short, ending before cubital fork.

Type.—Eremoleon angustus Banks.

It also includes *Myrmeleon efferus* Walk. Readily known from other American genera by the venation Both species have the middle tibiae much spotted with black, there being a series of bands beneath. The two species known to me are separable as follows;

A black spot before pterostigma in fore-wings; in hind-wings two rows of cells (for most of distance) between the cubitus and the hind margin ..... **efferus** Walk.

No prominent black spot before stigma; in hind-wings but oue row of cells between cubitus and margin; legs more slender than in *efferus* ..... **angustus** Bks.

ASCALAPHIDAE.

Suhpalasca hermosa n. sp.—Clypeus pale, above it is a band of dense black hair reaching from eye to eye, above this the face is dark; dense black hair around bases of antennae and on the vertex; antennae black at base, beyond pale, annulate with black, knob brown, antennae not reaching to the stigma. Thoracic dorsum black with fine black hair; pleura pale, with white hair; legs shining jet black, except the basal part of femora which is pale. Abdomen dark brown, with pale spot on the side of each segment. Wings almost hyaline, faintly yellowish; venation black; costal cross-veins, those before radial sector and those between radial sector and radius, are margined with brownish, and the veinlets beyond stigma and above subcosta also margined, while those between the cubitus and median show a dark spot near middle; hind wings similar to the fore-wings in markings. Tips of wings nearly acute; stigma with five veinlets; a few cross-veins before the radial sector crossed; five branches to radial sector; costal cells in fore-wing as high as long; in hind-wing some a little longer than high; three series of cells at tip beyond the stigma; cell before cubital fork in fore-wing is triangular; beyond the cubital fork are three cells; marginal cells in anal area of hind wings are much higher than broad. Expanse 84 mm.

Type.—♂. From Kandy, Ceylon, May (Green).

The genus *Suhpalasca* can be distinguished from *Hybris*, *Acheron*, etc., by the nature of the veining between radial sector and median near the margin of wing; in *Hybris*, etc., there are about three rows of cells nearly parallel to the me-

dian, while in *Suhpalasca* there is a row parallel to the radial sector, or rather its branch, and below it the venation is more irregular.

PANORPIDAE.

The genera of Panorpidae may be arranged in the following groups and tabulated as below:

1. Head deflected under pronotum; eyes nearly connate above; no ocelli; costal area of fore-wings with many veins; each tarsus ends in two small claws .....MEROPEINAE—3.
   Head prominent from above; eyes widely separated above; costal area of fore-wings with few veins..... 2.
2. No ocelli; wings rudimentary; tibial spurs very weak; each tarsus with two small claws; female with long corneous ovipositor. BOREINAE—4.
   Ocelli present; tibial spurs distinct.....PANORPINAE—5.
3. Anal area and rest of fore-wings with many cross-veins forming several rows of cells; legs very bristly; subcosta and radius run close together for some distance and then both fork; antennae slender .....**Notiothauma.**
   Anal area with few cross-veins; legs with only apical bristles; antennae thickened; subcosta with branches hardly forked. **Merope.**
4. With but one genus .....**Boreus.**
5. Tarsi end in two small claws; tibial spurs not very long; middle joint of labial palpi enlarged..... 6.
   Tarsi end in one claw; last joint bending back on the preceding; tibial spurs extremely long; middle joint of labial palpi slender; median vein of fore-wings forked near base. BITTACINI—9.
6. Median vein of fore-wing forked near base, cubitus simple. CHORISTINI—7.
   Median vein of fore-wing not forked near base, but the cubitus is so forked.....PANORPINI—8.
7. Several costal cross-veins and several cross-veins from subcosta to radius (new genus or subgenus).
   One costal cross-vein (near base) and two from subcosta to radius. **Chorista.**
8. Beak much longer than distance between eyes; no spine on cheeks. **Panorpa.**
   Beak very short, not as long as distance between eyes; a spine on each cheek.....**Panorpodes.**
9. No wings; no elevated mesothoracic lobes; and the posterior ocelli are more than twice their diameter apart...**Apterobittacus.**
   Wings present; elevated mesothoracic lobes; posterior ocelli not twice their diameter apart.....**Bittacus.**

Notiothauma McLachlan.—Based on a broked specimen. There is a perfect female in the Hamburg Museum. To McLachlan's description may be added that the legs are very slender, and with many long, stiff bristles; the subcosta and radius run out close together for a distance and then each forks. There are stiff, thick bristles on thorax and base of wings. The specimen is from Valdivia, Chili.

CHORISTA Klug.

Euphania Westwood is the very same form. *Panorpa ruficeps* Newm. goes in this genus, but differs from *C. australis* in larger size and more fumose wings. In several of the European museums is a species, labelled as *Euphania*, but with more cross-veins throughout, as in figure; it may form a new genus or subgenus.

PANORPA Linn.

Several genera have been separated off from *Panorpa*, but on characters of little value or variable in occurrence. *Aulops* Enderl, for those with the subcosta ending long before the stigma separates species which are evidently otherwise very closely allied, moreover the subcosta often bends near middle to the costa, and sometimes connected thereto. The number of cross-veins between anal and auxillary veins has been used, but often varies in the two wings of one specimen; the length of the abdomen is not of generic value, so that *Leptopanorpa*, *Himanturella* and *Campodotecnum* are synonyms of *Panorpa*.

BITTACUS.

I cannot find any valuable character to separate any species off from this genus except *B. apternus*. *Diplostigma* Navas is based on a character more or less evident in other species, probably due to age, *B. chlorostigma* has this double appearance of the stigma strongly developed. *Thyridates* Navas, for *B. chilensis*, also lacks a peculiar character; it and *B. blancheti* have three costal cross-veins, but *B. affinis* Westw. and *B. testaceus* Klug have one extra costal cross-vein. In *B. chilensis* the radial sector forks much before the forking of upper branch of the median; but in several species this is more or less evident, and in a series of *B. occi-*

dentis it is variable. *B. capensis. B. australis* and *B. sinensis* have an outer cross-vein between cubitus and anal; but in *B. pilicornis* and *B. strigosus* some have it, at least in one wing. The number of cross-veins between the first and second anal is also variable in at least one species, *B. occidentis;* in *B. stigmaterus* there is apparently always one such cross-vein. The number of cross-veins under the stigma is fairly constant for many species, but in *B. strigosus* it varies in one specimen. *B. apicalis* has but one cross-vein behind the stigma.

From the variation in venation as shown above I prefer to keep *Bittacus* in its broad sense, and *Harpobittacus* McLach., *Diplostigma* Navas, *Thyridates* Navas and *Haplodictyus* Navas as synonyms. I have seen the types of all. *Thyridates* has a rather different appearance, and may prove to have some structural character by which it may be retained as a separate genus.

The species of *Bittacus* in the Berlin Museum from Brazil may be separated as follows:

1. The first (inner) series of gradate veins makes a nearly direct oblique line across the wing..... 2.
   The upper cross-vein and lower one are farther out than the ends of the middle ones; the stigma is short, with two cross-veins behind it.....**brasiliensis.**
2. Stigma with one cross-vein behind; hind femora and tibia not dark at tip.....**flavescens.**
   Stigma six or seven times as long as broad, with one cross-vein behind; tips of hind femora and tibia dark...**geniculatus.**
   Stigma with two cross-veins behind; tips of hind femora and tibia black .....**femoralis.**

Bittacus affinis Westw. (in British Museum) has the stigma long and evenly curved behind, and one cross-vein behind it to the radius.

The three species of *Bittacus* from South Africa in the Berlin Museum can be separated as follows:

1. Faint clouds on the origin of the radial sector, its branches and elsewhere; tips of all femora and tibiæ dark; stigma four times as long as broad, with two cross-veins behind...**nebulosus.**
   No such clouds; stigma rather shorter; front femora and tibia not dark at tip..... 2.

2. Cross-veins in four series, or rather irregular (except first series), hind femora thickened.....**testaceus.**
Cross-veins is three series; hind femora normal.....**capensis.**

There is also another African species in which the front femora are black on the apical half, probably a new species.

Panorpa mexicana n. sp.—Pale yellowish; antennae, except basal two joints, black; thorax unspotted; wings hyaline, a transverse brown spot over forking of radial sector, a narrow band below basal part of stigma, somewhat bent and interrupted beyond the middle, extreme apex very narrowly brown, and a narrow brown band before tip (in one wing interrupted); venation black, the five cross-veins in apical part of wing pale; stigma pale yellowish. Wings slender; the subcosta runs into the costa much before stigma in all the wings; stigma long and slender; radial sector connected back to radius twice, once at stigma; behind the basal connection is a cross-vein between the lower branch of the radial sector and upper branch of median, the forking of median hyaline. Fifth abdominal segment without tooth or process, sixth rather short, seventh more slender than usual. Expanse 25 mm.

Type.—♂. From Orizaba, Mexico (Crawford).

TRICHOPTERA.

Plectrotarsus gravenhorsti Kol.

Several specimens from Hobart, Tasmania, differ in several respects from Kolenati's description, but also vary among themselves. All are females, and have the mouthparts as figured. The radius is plainly curved at stigma, and several specimens have an extra fork in apical part of wing as in figure, in one specimen the discal cell in the hind wings is very much longer than in the others. The specimens in good condition show three hyaline spots on each fore-wing covered with snow-white hair, one at base of the third apical cell, one on the thyridium, and one on arculus; the "margine antico croceo" of Kolenati is scarcely evident, except in one specimen. From Kolenati one would infer that the legs, except tarsi, were pale; in these specimens the legs are black, except the front femora and hind tibiae, and in two specimens the front femora are blackish. The spines are very prominent, longer than the width of a joint.

I should think that the insect should be placed in the Limnephilidae, or rather, Phryganeidae.

Chimarrha abyssinica n. sp.—Yellowish, with golden hair; a large triangular black spot connecting the ocelli on vertex; antennae, except basal joints, brown; palpi brown beyond second joint, last joint longer than any others; vertex with a long narrow wart each side behind, thorax mostly blackish above and below; abdomen golden yellowish, legs also, but spurs blackish, and tarsi brown; wings a uniform black, but fore-wings with pale spots as follows: a large circular spot before anastomosis, not reaching either margin, with short white hairs; a streak in basal costal space, and one between cubitus and anal in basal part of wing, and a small white mark on arculus. In fore-wings the radius is sinuate before stigma, and the radial sector sinuate before forking; fork three is quite short pedicellate. Expanse 17 mm.

Type.—♀. From mountains near Harrar, Abyssinia (Kristensen).

Marilia modesta n. sp.—Brown; palpi with white hair; antennae with white hairs at tips of joints, head and thorax with grayish-white hair; legs pale, dark on tarsi, front tibia and tarsi black. Wings pale, with yellowish venation, and clothed with gray and black hair, but no distinct pattern, black toward tips, then paler, and extreme tip and fringe black, black at end of first apical cell, and on lower side of second cell near base, and below forking of cubitus is a dark spot; hind-wings gray, with black fringe, at base of hind-wings is a corneous spot, and from it a tuft of long black hair spreads out in all directions. Expanse 25 mm.

Type.—♂. From Villavicencio, E. Colombia, 450 meters (Fassl).

Asotocerus falcatus n. sp.—Head pale, palpi dark gray, vertex sparsely short haired; antennae pale, narrowly annulate with black; thorax brownish, with short golden hairs on middle; abdomen brown above, paler beneath; legs pale; hind tibiae curved, fuscous, and fringed with long, fine hairs. Wings grayish fumose, darker on costal region, especially near base; veins dark, surface clothed with very short, fine, golden hair, but not dense enough to give a golden color to wing; a black dot in base of third apical cell, apical fringe partly black; tips of wings very distinctly falcate; hind-wings fully as dark as fore pair, and less hairy, fringe mostly black. In hind-wings the first apical fork has an extremely short pedicel, second and third forks equal. Expanse 33 mm.

Type.—♂. From Trincomali, Ceylon, Sept. (Green).

Amphipsyche vedana n. sp.—♀. Whitish, with white hair; no spots on face; tips of antennal joints brown; vertex only slightly elevated each side; wings rather truncate at tip; marginal cell slender, the median cell also more slender than in *A. nirvana* but broader

than in *A. proluta ;* fork 4 plainly pedicellated ; middle legs with thin lamellae on tibiae and tarsus. Expanse 20 mm.

Type.—♀. Pusa, India, 15th September.

I cannot consider it the female of *A. nirvana* because of the smaller size, the pedicellate fork 4, narrower marginal and median cells and absence of spots on face, and especially as it was taken in September, while *A. nirvana* was captured in March. It agrees with *A. proluta* McLach. in slender marginal cell, but the median cell is broader and fork 4 pedicellate, and it is considerably smaller than the specimen of *A. proluta* I possess from Amurland.

Amphipsyche nirvana n. sp.—♂. Whitish, with white hair ; two approximate black spots on lower margin of face ; tips of antennal joints brownish ; wings yellowish hyaline, venation yellowish, fore-wings as figured, hind-wings much as in *A. proluta ;* no cross-vein in marginal cell at end of subcosta ; legs slender, middle and hind femora with long, erect, fine white hair. Lower appendages of male slender throughout (in *A. proluta* swollen before tips). Expanse 30 mm.

Type.—♂. Pusa, India, 23d March.

Differs from *A. proluta* in spots on face, genitalia, and the broader marginal and median cells.

Betten, in his report on Indian Trichoptera, figures this or a closely allied species under the name of *Phanostoma* sp., but *Phanostoma* has a different venation. Betten shows a cross-vein in the marginal cell not seen in *A. nirvana.*

Phylloicus magnus n. sp.—Head pale ; basal joint of antennae pale, then dark for several joints, then pale ; antennae longer than wing expanse ; thorax pale brownish ; abdomen brown ; legs pale, tarsi darker, spurs 2, 4, 4. Wings rather yellowish-brown on the base, darker brown beyond, fringe black. Wings in nearly all parts of venation as *P. assimilis*, but in fore-wings the median cell reaches much further basally than the discal cell, there is a dark spot in the thyridial cell below base of median cell. In shape the fore-wings are not as broad as in *P. assimilis*. The size is much larger than any other species. Expanse 45 mm.

Type.—♀. From Monte Socorro, Colombia, 3600 meters (Fassl).

Oecetina mahadeva n. sp.—Head gray-haired, with some white hairs intermixed ; palpi long, short haired, except the basal joint ; antennae pale on basal joints below, darker above, beyond blackish with

white annulus at base of each joint for some distance out; thorax yellowish-brown, with some yellowish hair; abdomen blackish, greenish below; legs pale, but tibia and tarsi darker. Wings brownish, with mostly golden, or yellowish toward tip, but some black hair; three or four black spots at tip of wing on ends of veins; a black streak along median vein just before the anastomosis, and another, hardly as distinct on base of lower branch of the radial sector. Hind-wings infuscated, with long, dark, almost blackish fringe. The cross-vein between radial sector and median in fore-wings is almost its length before the end of the discal cell. Expanse 11 mm.

Type.—♀. From Chapra, Bengal, India (Mackenzie).

Oecetina pretiosa n. sp.—Pale yellowish, with yellow hair, antennal joints tipped with brown; wings rather faintly brownish-yellow, with sparse golden hair and yellowish venation, but the cross-veins and forkings of longitudinal veins are black as shown in the figure; costa with long hairs; hind-wings narrow, acute, grayish, with very long gray fringe; legs pale yellowish. Expanse 14 mm.

Type.—♂. From Chapra, Bengal, India (Mackenzie).

Setodes lineata n. sp.—Face white, with white hair; palpi very long; antennae yellowish, barely annulate with brown at tips of the joints; vertex pale brown, with three snow-white lines, one median, and an oblique one each side, thorax also browu, with two white lines; fore-wings also pale brown, with the small white lines, usually margined with black, a white crescent at tip, these lines placed as in figure; hind-wings rather dusky toward tips, fringe gray; legs slender whitish. Expanse 8 mm.

Type.—♂. From Chapra, Bengal, India (Mackenzie).

Leptocella fenestrata n. sp.—Yellowish, clothed with white hair, antennae narrowly annulate with dark. Wings hyaline, with white, yellowish and black scales; before the anastomosis with black and white scales, the black in narrow irregular bands; from the stigma and beyond the anastomosis many yellowish scales forming, with the black scales, a network which encloses oval spots of white scales, fringe short; hind-wing with upper venation indistinct, although some of it can be traced, otherwise similar to that of *L. gemma* Müll. Upper male appendages bluntly truncate at tips. Expanse 25 mm.

Type.—♂. From Lino, Panama, 800 m. (Fassl).

Macronema ulmeri n. sp.—This is probably the form figured by Ulmer, Coll. Selys, VI, Pl. III, fig. 16, as a variety of *M. hyalinum*. The wings are marked about the same, with the curved line in the apical part of wing, widened, however, below, the spot on the anal angle not as large as the stigmal spot above it, and the extension of the dark costal streak does not reach the posterior streak; in the hind-

wings the upper apex is blackish, and there is a small faint cloud before the fork of the radial sector. Body black, venter pale yellowish; face pale, but a large black spot on middle of front margin; antennae black, except yellow basal joints; femora yellow, tibia II and III brown, tarsi II and III black; tibia I jet black, tarsi I pale; spurs pale. Expanse 23 mm.

Type.—♂. From Rio Negro, Colombia, 500 m. (Fassl).

Centromacronema nigrifrons n. sp.—Body black, as dark beneath as above, head coal black and basal joint and two or three others of antennae also coal black, beyond paler, and the annulations so faint as almost invisible. Wings much as in *C. apicale*, the yellow is a deeper and more reddish-yellow, and the apical black, which is sharply limited, does not reach before the anastomosis; in the hind-wings the fifth fork barely reaches before the cross-vein. In shape the fore-wings are plainly shorter and more truncate at tips than *C. apicale*. Expanse the same.

Type.—♂. From Rio Negro, E. Colombia, 800 meters (Fassl).

Centromacronema extensum n. sp.—Brown above, yellowish beneath; antennae yellowish; fore-wings nearly uniform brown, like some forms of *C. auripenne*, much of the hind-wings also similar, but paler behind than in front. In venation similar to *C. auripenne*, except the lower part of fork 5 is united for a short distance with the next vein (not connected thereto by a cross-vein); in the hind-wings the fifth fork extends much before the cross-vein. In shape the fore-wings are longer and more slender than *C. auripenne;* and the last joint of the maxillary palpi, although very long, is not as long as in *C. auripenne* and *C. apicale*. Expanse 44 mm.

Type.—♂. From Lino, Panama, 800 m. (Fassl).

CORDILLOPSYCHE n. gen.

Related to *Polycentropus*, with spurs 3, 4, 4; forks 1, 2, 3, 4, 5 in fore-wings; forks 2, 3, 5 in hind-wings; in hind-wings discal cell is open; hind tibia nearly twice as long as hind femora; antennae not very slender; stigma very long.

Cordillopsyche costalis n. sp.—Pale yellowish, antennae almost white; fore-wings with costal area nearly wholly brown, stigma dark, rest of wing mostly pale brown, with many hyaline spots, one beyond the anastomosis is in the form of a transverse band, a large dark spot at the anal angle, and cubitus mostly dark bordered, a black dot in thyridial cell below base of the discal cell; hind-wings gray-hyaline, with a long dark gray fringe. Expanse 15 mm.

Type.—♀. From Cañon del Norte, Tolima, Colombia, 1700 m., March (Fassl).

Rhyacophylax varius n. sp.—Brownish ; vertex black, antennae whitish, palpi dark beyond basal joints ; thorax black, legs yellowish, femora and tips of tibia blackish, wings brown, black on tips, and a large black spot in middle, before it is an area with pale greenish scale-like hairs, and beyond it are two incomplete bands, the costal parts of the bands broader and white, the rest greenish, the outer band broader than the inner band ; apical fringe mostly white. Expanse 14 mm.

Type.—♂. From Turricares, Costa Rica.

Symphitopsyche plutonis n. sp.—Deep dull black ; antennae and legs brownish-yellow. Head with short golden hairs, more dense on the pronotum, the short hair of the wings, in some lights, shows yellowish. Eyes rather small, head strongly convex above eyes, each side on vertex is a large subtriangular wart ; antennae faintly ringed, the joints moderately long ; second joint of palpus longer than third or fourth, which are subequal, and convex below, fifth longer than third and fourth together. Pronotum rather large, with a large wart each side near middle, and a smaller one each lateral side. Venation nearly as in *S. mauretanica* McLach. as figured by Ulmer ; in hind-wings the subcosta and radius very plainly unite before tip, in the fore-wings the subcosta runs into the margin, but before its tip it is very close to the radius, and in some lights appears to run into radius. The discal cell is a trifle shorter than in *S. mauretanica*, in fore-wings the connecting veinlet from cubitus to anal is much farther out and more oblique, and in hind-wings the second fork does not reach back to the cross-vein beneath discal cell, and the cross-vein is transverse, not oblique ; in hind-wing the radial sector may be connected to median, but the vein here is very indistinct. Expanse 13 to 15 mm.

Type. — ♂. From mountains near Harrar, Abyssinia (Kristensen).

Dipseudopsis buddha n. sp.—Reddish or yellowish-brown, vertex, mesonotum, and dorsum of abdomen, blackish, tips of antennal joints dark ; wings brown or dark yellowish-brown, with sparse golden hair, stigma pale, and pale spots in bases of second and fourth apical cells and just before base of median cell, and also just below fork four ; hind-wings a uniform brown ; legs yellowish-brown. In fore-wings forks 1 and 3 are each a little shorter than their pedicels, forks 2 and 4 each reaching to anastomosis. The modified spur of hind tibia of male as figured ; the short process strongly curved, but without teeth on edge, the long process furcate toward tip. Expanse 25 mm.

Type.—♂. From Chapra, Bengal, India (Mackenzie), and Pusa, India, 23d August. In shape of the spur related to *D. indicus* McLach., but the processes are shorter, and the short one without teeth.

Nyctiophylax abrupta n. sp.—Face with yellowish-brown hair, a large dark brown tuft each side on vertex, with whitish hair between; antennae pale yellowish, the tips of the joints narrowly pale brown; pronotum with yellowish hair; wings with mostly yellowish, and some brownish hair, forming a very much mottled appearance, but not strongly contrasting, a more prominent brown mark at base of the stigma, and at tips of the longitudinal veins; hind-wings grayish, the fringe pale; legs pale yellowish, the hind tarsi marked with brown: abdomen brown, tips pale. Expanse 9 mm.

Type.—♀. From Chapra, Bengal, India (Mackenzie).

DOLOCHOREMA n. gen.

Related to *Psilochorema* and *Atopsyche*. An extra cell beyond end of the discal cell in fore-wings; palpi as in *Atopsyche;* venter of abdomen without the preapical spines, but the fourth segment (of male at least) with a slender appendage as in some genera of Hydropsychidae; hind-legs with many minute erect spines; spurs 2, 4, 4.

This genus is closely related to *Atopsyche* and *Psilochorema*, and less closely to *Hydrobiosis;* all have many stiff erect hairs on the wings like Hydroptilidae; in all the palpi have the last joint very long, slender and flexible, but perhaps not divided, the tip of the second joint of the palpi is hyaline white; the hind-legs in all have minute spines; all, except *Hydrobiosis*, have what looks like an abnormal venation.

Dolochorema irregularis n. sp.—Similar in size and general appearance to *Atopsyche longipenne*, but the markings all paler; the joints of antennae beyond middle are much more broadly banded with dark than in *A. longipenne;* anterior tibia with pale bands in middle and at tip; first and second tarsal joints dark except tips; other legs pale; wings a nearly uniform brown, with many black hairs, basal anal area darker than rest of wing, fringe brown and black; hind-wings gray fumose, darker at tips, fringe on hind margin extremely long; abdomen black above, pale yellowish beneath. Expanse 26 mm.

Type.—♂. From Cuzco, S. E. Peru, 2300 m. (Fassl).

Explanation of Plates.

PLATE XXIII.

Fig. 1.—*Setodes lineata*, fore-wing.
" 2.—*Symphitopsyche plutonis*, male genitalia.
" 3.—*Oecetina pretiosa*, fore-wing.
" 4.—*Symphitopsyche plutonis*, fore-wing.
" 5.—*Symphitopsyche plutonis*, last segment of female.
" 6.—*Oecetina pretiosa*, maxillary palpus.
" 7.—*Malacomyza terminalis*, head and antenna.
" 8.—*Dipseudopsis buddha*, genitalia.
" 9.—*Hemerobius greeni*, male genitalia.
" 10.—*Notiobiella viridinervis*, male genitalia.
" 11.—*Plectrotarsus gravenhorsti*, fore-wing.
" 12.—*Curgia albomaculata*, fore-wing.
" 13.—*Amphipsyche nirvana*, male genitalia.

PLATE XXIV.

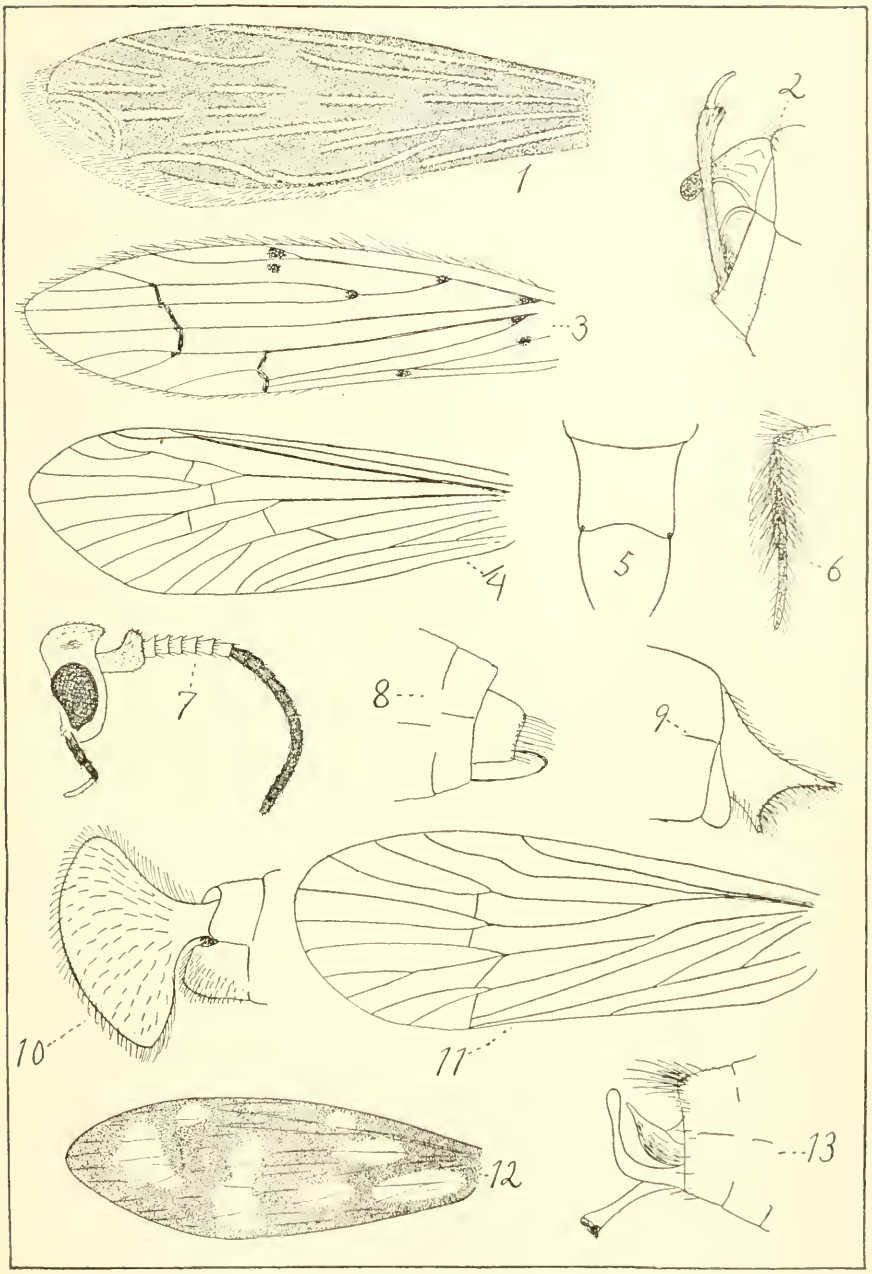
Fig. 14.—*Plectrotarsus gravenhorsti*, mouth parts.
" 15.—*Calomantispa spectabilis*, wings.
" 16.—*Asotocerus falcatus*, male genitalia.
" 17.—*Amphipsyche nirvana*, fore-wing.
" 18.—*Malacomyza terminalis*, fore-wing.
" 19.—*Dipseudopsis buddha*, hind spur, male.
" 20.—*Amphipsyche vedana*, middle tarsus, female.
" 21.—*Amphipsyche vedana*, fore-wing.
" 22.—*Nothochrysa aequalis*, male genitalia.

PLATE XXV.

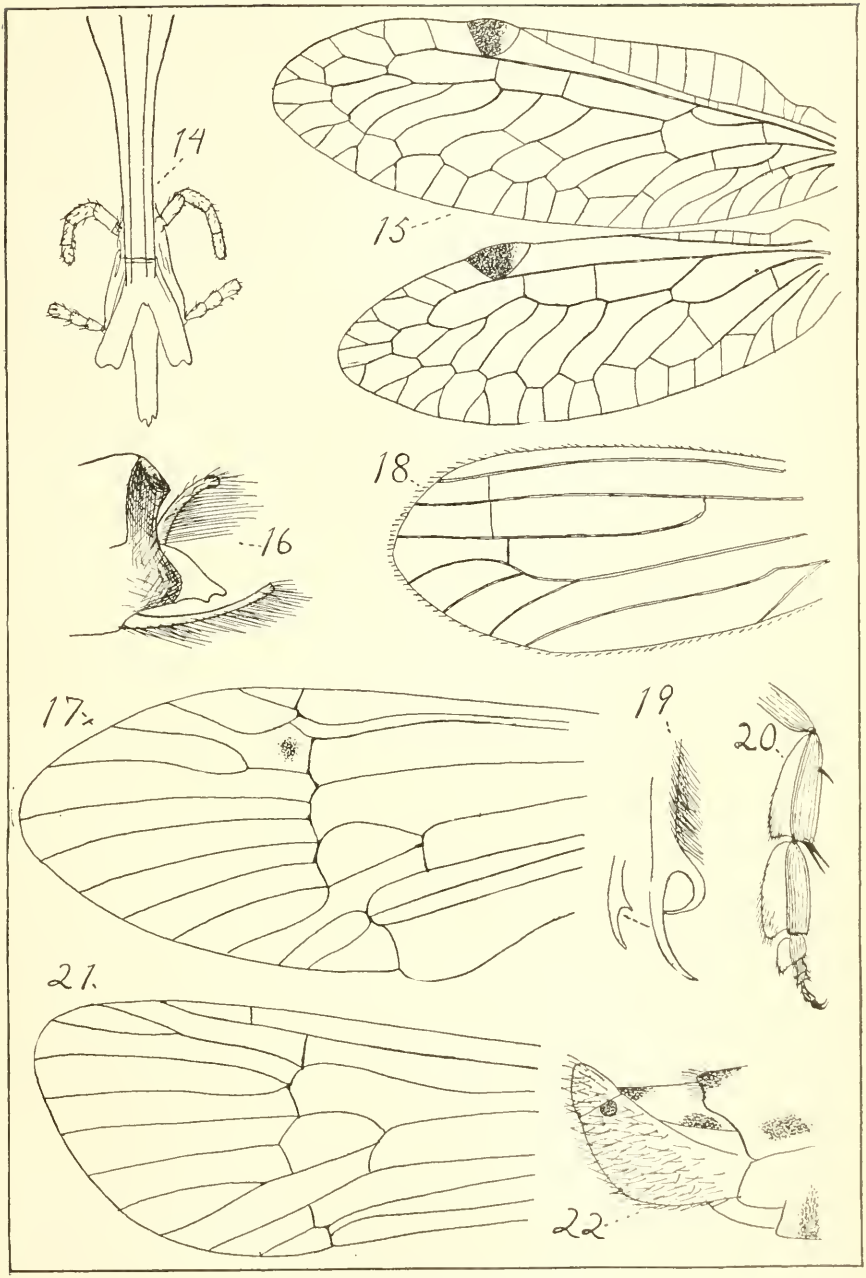
Fig. 23.—*Anisoptera notha*, fore-wing and hind leg.
" 24.—*Chorista* sp., genitalia (Paris Museum).
" 25.—*Ditaxis biseriata*, wing.
" 26.—*Mantispa chilensis*, wing.
" 27.—*Theristria delicatula*, wing.
" 28.—*Chorista* sp., fore-wing (Paris Museum).
" 29.—*Leptoperla beroe*, wing and hind tarsus.
" 30.—*Leptoperla opposita*, wing and hind tarsus.
" 31.—*Centromacronema extensum*, genitalia.
" 32.—*Centromacronema nigrifrons*, genitalia.

PLATE XXVI.

FIG. 33.—*Leptocella fenestrata*, genitalia.
" 34.—*Sisyra bakeri*, genitalia.
" 35.—*Cordillopsyche costalis*, wings.
" 36.—*Brachynemurus fenestratus*, tip of abdomen.
" 37.—*Glenoleon radialis*, tip of hind-wings.
" 38.—*Dolochorema irregularis*, hind-wing.
" 39.—*Ochthopetina clarissa*, ventral plate.
" 40.—*Dolochorema irregularis*, fore-wing.
" 41.—*Anisoptera fasciatella*, fore-wing.
" 42.—*Leptocella fenestrata*, marks of fore-wings.



EXOTIC NEUROPTERA—BANKS.



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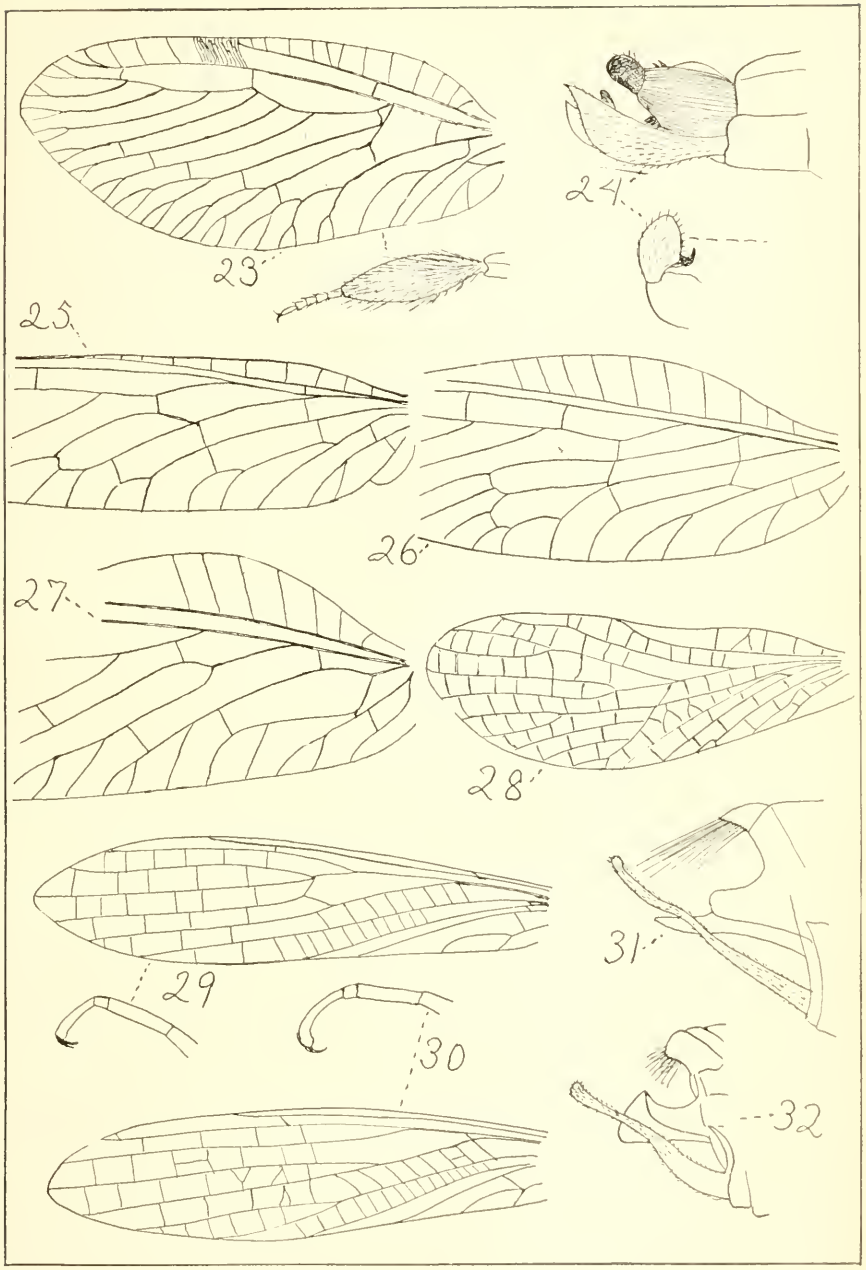

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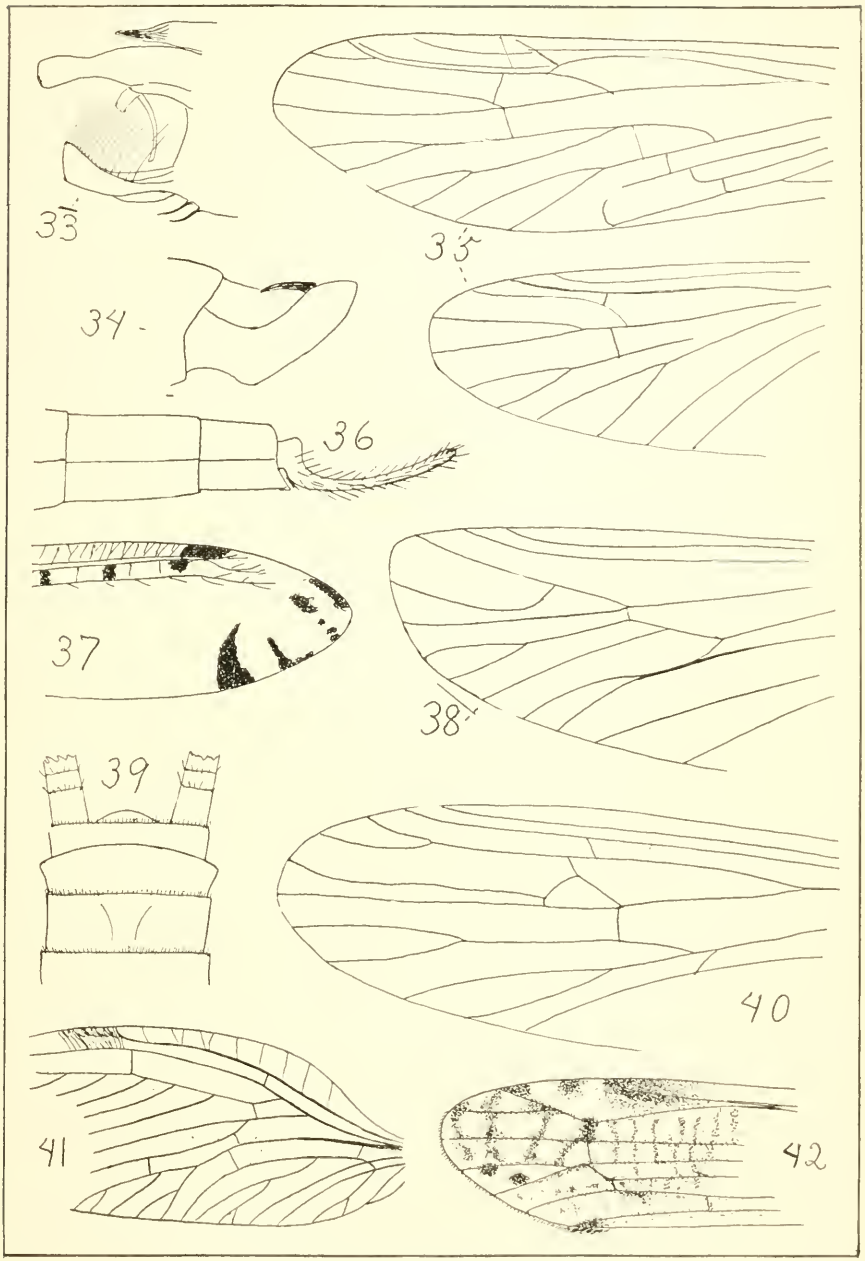

EXOTIC NEUROPTERA—BANKS.

DESCRIPTIONS OF NEW CYNIPIDAE.

BY WILLIAM BEUTENMULLER.

The type specimens of all the new species described in this paper are in the collection of the author.

Andricus montezumus sp. nov.

Female.—Head red or reddish-brown, eyes and ocelli black, distinctly and evenly rugose, and finely pubescent. Antennae 14-jointed rufous, joints 3, 4, 5 and 6 slender and almost of equal length, 7 and 8 shorter, 9–13 considerably shorter than the preceding joints and of equal size, 14 somewhat longer. Thorax almost black, evenly granulated; parapsidal grooves entire, fine and distinct, and running obliquely to the scutellum where they are rather widely separated; anterior parallel lines sharply defined and not quite extending to the middle of the thorax; lateral grooves distinct and running obliquely forward to near the parapsidal grooves. Pleurae pitchy brown-black finely aciculated. Scutellum almost black, somewhat rufous apically, evenly rugose, slightly more so than the thorax, and with two small foveae at the base. Abdomen reddish-brown, darker terminally, smooth, shining, second segment with short hairs basally and at the sides, smooth dorsally and terminally, following segment with short hairs laterally. Legs reddish-brown, posterior pair darker. Wings pale yellowish hyaline, veins brown, radial area open, cubitus extending to the first cross-vein, areolet large, second cross-vein prominently angulated. Length 2–3 mm.

Gall.—On the twig of a species of live oak (*Quercus* sp.). Polythalamous. Composed of a number of irregularly rounded bodies, tightly grown together and forming a solid mass. The outer surface is leather-brown, rugose with a number of fissures and cracks indicating the individual galls. Inside it is light wood-brown and exceedingly hard, almost like solid oak wood, making it difficult to cut with a knife. Length, 55 mm.; width, 35 mm.

Habitat.—Mountains in Mexico, altitude 5000 feet.

This species has been in my collection for some years past, and I do not remember from whom I obtained it, and the exact locality from whence it came. All I know is that it was collected in the mountains somewhere in Mexico. A similar kind of gall was sent to me by Mr. Lewis H. Weld, who collected the specimen at Lake Chapala, Jalisca, Mexico, from the mountains at the west end of the lake, above San Pedrito, in the summer of 1910. The male is not known.

Andricus fullawayi sp. nov.

Female.—Head black, minutely rugose, mouth parts brown. Antennae 13-jointed, brown. Thorax black, finely and evenly granulated or shagreened, shining; parapsidal grooves sharply defined, smooth and continuous, converging at the scutellum where they are moderately widely separated, in their course they are slightly curved; anterior parallel lines very fine and extending to about the middle of the thorax; median groove scarcely evident or wanting; lateral grooves fine and smooth. Pleurae aciculate and slightly hairy. Scutellum distinctly rugose, slightly hairy, and with two large approximate basal foveae which have the bottoms smooth and shining. Abdomen black, compressed, smooth and shining. Legs brown, coxae darker. Wings hyaline, pubescent, veins brown; radial area long, open at the margin; cubitus almost reaching to the first cross-vein; areolet distinct and well defined. Length 1.50–2.25 mm.

Gall.—In a mass from a few to twenty or more covered with brownish or reddish-brown wool on the underside of leaves of white oak (*Quercus lobata*). Monothalamous. The individual gall is thin shelled and oval, light brown with the surface finely granulated. The galls stand upright on the leaf and are close together. The individual gall is 2 mm. high and 1 to 1.5 mm. wide.

Habitat.—Palo Alto, California.

The gall very much resembles those of *Andricus langerus* and *Dryophanta ignota*. It is the same species which Mr. David T. Fullaway referred to *Andricus flocci* (Ann. Ent. Soc. Am., vol. iv, 1911, p. 352), but it is not this species. The seed-like galls of *flocci* are different as well as the flies. In *flocci* the foveae of the scutellum are more widely separated than in *fullawayi*, while the head of the former species is red and the latter black. The male of *fullawayi* is not known.

Andricus lustrans sp. nov.

Female.—Head dark reddish-brown, minutely punctate and pubescent. Antennae reddish-brown and pubescent, 14-jointed, terminal joints clavate, short and equal in size, joints 3, 4, 5 and 6 elongate and slender, 3d longer than the others. Thorax subopaque, dark pitchy brown-black, distinctly punctate, the punctures in form of pits, pubescent. Parapsidal grooves sharply defined and extending from the scutellum forward to the middle of the thorax. They are parallel anteriorly and curved at the scutellum where they are rather widely apart; anterior parallel lines distinct and extending almost to the middle of the thorax, close to the ends of the parapsidal grooves, lateral grooves broad and extending forward beyond the parapsidal grooves.

Pleurae punctate, hirsute with a large smooth polished area. Scutellum brown-black, rugoso-punctate with two large foveae at the base separated by a ridge. Abdomen not compressed brown-black, paler at the base, smooth, shining with a few hairs laterally at the base. Legs reddish-brown, all the femora dark pitchy brown, except at the knees. Wings hyaline, veins yellowish-brown, semi-transparent, radial area closed and broad; cubitus exceedingly delicated and not well defined, areolet small and faint; cross-veins heavy, second outwardly curved. Length 2.25-2.50 mm.

Habitat.—Austin, Texas, two females, C. Hartman collector.

The gall and male are not known.

Andricus brevicornis sp. nov.

Female.—Head red, finely granulated. Antennae reddish-brown, short and stout, 14-jointed, third joint as long as the first and second together, fourth shorter than the third, the following joints much shorter than the preceding and of equal size. Thorax black, opaque, finely and evenly granulated. All the grooves are narrow and sharply defined. Parapsidal grooves continuous and running obliquely to the scutellum, where they are rather widely separated. Median line fine and continuous. Anterior parallel lines extending to the middle of the thorax. Lateral grooves deep, very long and running parallel with the parapsidal grooves, but not extending to the anterior part of the thorax. Pleurae rugose and somewhat finely aciculated with a small smooth area situated posteriorly. Scutellum coarsely rugose, foveae at base large, deep and fairly well apart. Abdomen smooth shining reddish-brown, slightly pubescent at the extreme base. Legs dark yellowish-brown. Wings hyaline, veins yellowish-brown and semi-translucent; radial area open, the veins almost touching the costal margin; cubitus fine and extending to the first cross-vein, areolat large; second cross-vein angulate. Length 2.50–3 mm.

Habitat.—Lakehurst, New Jersey.

A fine large species with short stout antennae. The thorax is evenly granulated, and all the grooves are fine and distinct. I have taken a number of the flies ovipositing in the buds of white oak (*Quercus alba*) late in May, but I do not know what the gall is like.

Cynips dimorphus sp. nov.

Female.—Form robust. Head black, rugose and covered with short white pubescence. Antennae 14-jointed, joints 1–8 slender, subequal in length, 8th thicker at the tip, joints 9–14 short, thicker than the preceding, and forming a club, all pitchy brown-black. Thorax black with decumbent whitish hairs, distinctly and evenly rugose-punctate, subopaque; parapsidal grooves fine and almost reaching the anterior

part of the thorax, where they are inwardly curved; anterior parallel lines short; median groove wanting, lateral groove scarcely evident or wanting. All the grooves are punctate and almost lost in the rugosity of the thorax. Pleurae black and evenly rugose. Scutellum black, more rugose than the thorax and with short whitish hairs, the apex is well rounded and at the base are two rather large opaque foveae. Abdomen black, punctate and covered with short hairs. Legs: fore and middle pairs brownish, hind pair black, all pubescent. Wings hyaline, veins brown; radial area almost closed; areolet large; cubitus very faint and not extending to the first cross-vein; second cross-vein slightly infuscated and outwardly angulate. Length 2.50 mm.

Gall.—In masses on the basal part of the midrib or petiole on the underside of leaves of burr oak (*Quercus macrocarpa*), dwarf chestnut oak (*Q. prinoides*), white oak (*Q. alba*) and other trees belonging to the white oak group. They occur in rounded masses from a few to about thirty in each cluster. They are closely packed together, but each gall is separate and easily detachable. They are fastened to the leaf by a point, rounded on top and but slightly pressed out of shape, except basally. Monothalamous, almost globular, pointed basally, with the surface roughened, greenish, and more or less tinged with pink when fresh. Grayish when old and very hard. Hollow inside with a single round larval chamber. The individual gall measures from 2.50–3 mm. in diameter. The masses are from 6–15 mm. long and almost as wide.

Habitat.—Evanston, Illinois, collected by Lewis H. Weld.

The galls occur from the latter part of August until late in October, or into November, when they become mature and detached from the leaf. The flies emerge during the spring the following year. I have found the galls of this species on *Quercus alba* and *Q. prinoides* on Long Island, New York, and in New Jersey, but never succeeded in obtaining the flies. The four females described above were cut from galls by Mr. Lewis H. Weld, May 11, 1911. Mr. Weld's galls were taken on *Quercus macrocarpa* late in August the preceding year. The name for this species was proposed by the late Dr. W. H. Ashmead for specimens in his collection, but which he never described. Prof. C. P. Gillette recorded *C. dimorphus* from Michigan taken on the leaves of *Quercus prinus*, *Q. macrocarpa* and *Q. bicolor* (Rep. Mich. Bd. Agricul., 1888, p. 469). Ashmead's specimens were collected in Florida.

Cynips vacciniiformis sp. nov.

Female.—Head very dark brown, microscopically rugose with scattered, large deep punctures and densely covered with whitish hairs. Antennae 14-jointed; 1st joint long of equal width, 2d considerably shorter, 3d very long and slender, 4th and 5th shorter than the 3d, following joints gradually shorter and claviform. Thorax black, minutely rugose with large pit-like punctures and densely covered with whitish hairs. Collar red on each side. Parapsidal grooves fine, sharp and smooth, widely separated anteriorly converging at the scutellum, where they are fairly well apart. Anterior parallel lines lost in the rugosity of this part of the thorax. Lateral grooves short and fine. Median groove wanting. Pleurae brown, rugose and covered with whitish hairs. Scutellum coarsely rugose, basal foveae not evident, except by slight depressions. Abdomen pitchy brown covered with short whitish hairs which arise from minute punctures; dorsal region smooth and polished. Legs pitchy brown, hind femora blackish. Coxae dark brown and hairy. Wings hyaline, veins stout and brown; radial area broad and closed; second cross-vein angulate; cubitus faint and continuous; areolet large but faint; anal vein broken. Length 4 mm.

Gall.—In clusters on the midrib of post oak (*Quercus minor*), Monothalamous and moderately thick walled with a large round larval chamber. Globular and almost like a huckleberry or fruit of hackberry (*Celtis occidentalis*) with a more or less distinct nipple at the apex and long petiole or stem at the base by means of which it is attached to the leaf. Brown when old and probably green when fresh. The outer surface is slightly roughened or almost smooth. Diameter 4–7 mm.; petiole 1–2.50 mm. long.

Habitat.—Austin, Texas.

The gall somewhat resembles that of *C. dimorphus*, but is larger and more globose. It occurs in clusters like *dimorphus*, but the galls are less closely together and not pressed out of shape, each individual gall retains its globose shape. The male is not known.

Dryophanta cressoni sp. nov.

Female.—Head yellowish-brown, microscopically rugose and pubescent. Antennae long and slender, 14-jointed; joints 4–7 about equal in length, 3d longest, 8th to last shorter than the preceding, brown, slightly darker terminally. Thorax dark pitch brown, reddish-brown along the middle including the parapsidal grooves, distinctly rugose-punctate, with scattered hairs. Parapsidal grooves continuous, broad and deep; they run obliquely backward to the scutellum. Anterior parallel lines quite short. Lateral grooves very prominent and extending well forward. Pleurae pitchy brown rugose, pubescent, with a large, smooth, polished area. Abdomen smooth pitchy brown. Legs yellowish-brown. Wings hyaline, veins brown, radial area broad and

closed; cubitus extremely faint, and not extending to the first cross-vein; areolet small. Length 1.50 mm.

Gall.—Inside the young buds of post oak (*Quercus minor*). It is practically nothing more than a minute round and thin shell, invisible from the outside. Diameter 1 mm.

Habitat.—Austin, Texas.

A minute species with well marked parapsidal and lateral grooves. Described from a single specimen. The male is not known.

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